USER'S MANUAL

System Manager Client/Server

Version 3.0

Contents

Chapter 1—Introduction

Register Your Software Now

Included in your installation package is a registration card for POWERLOGIC® and POWERLINK® products.. Complete the information on this card and send it in today. Registering your software provides you with the following benefits:

- notice of software product upgrades
- 6 months free technical phone support (See **Technical Support** in this chapter)
- information on POWERLOGIC products
- information on POWERLOGIC training schools
- free subscription to *POWERLOGIC Solutions* newsletter

Overview

System Manager Software 3000 (SMS-3000) is compatible with existing circuit monitors, power meters, product interfaces for MICROLOGIC® circuit breakers, LIFEGARD® Model-85 transformer temperature controllers, and SY/MAX® programmable logic controllers (PLCs). The following table lists the features that SMS supports, by device:

Device	Setup	Resets	Table Display	Waveform Cap.	Logging/Trending	Alarming	Manual Control
Circuit Monitor	X	X	X	X	X	X	X
Power Meter	X	X	X		X	X	
MICROLOGIC Circuit Breaker		X	X		X	X	
Model 85 Trnsfrmr Temp Cntrl			X	X		X	X
SY/MAX PLC			X		X	X	X
Digitrip 810D Trip Unit		X	X		X	X	
Digital Relay		X	X		X	X	
POWERLINK AS Panelboard			X		X	X	X
POWERLOGIC Compatible			X		X	X	X

The two SMS-3000 instruction bulletins (*SMS-3000 System User's Guide* and *SMS-3000 System Administrator's Guide*) provide all of the information you will need to operate SMS-3000. You can read them in their entirety, or use them for reference. To locate information on a specific topic, see the table of contents or the index of each bulletin. The System Administrator's Guide tells how to install the software. It also describes other administrative tasks including working with the SMS database and setting up user accounts. The SMS User's Manual describes the tasks involved with using the software on a daily basis. It does not include installation instructions.

Add-On Modules

You can expand the functionality of SMS-3000 by using add-on modules. POWERLOGIC currently offers two add-on modules that enhance the capabilities of SMS-3000. They are:

- Interactive Graphics Client (GFX-1000)
- Additional SMS Client software packages (SMS-1000)

This bulletin does not provide detailed instructions for using these packages with SMS-3000. For instructions on using the add-on modules, see to the instruction bulletins included with the modules.

Notational Conventions

This bulletin uses the following notational conventions:

- **Bullets**—Bulleted lists, like this one, provide information but not procedural steps.
- **Multiple Step Procedures**—Each procedure is presented as a numbered list of steps.
- **Angle brackets (>)**—Angle brackets are used to denote a sub-menu for a command in a pull-down menu. For example, in the Setup menu, under the "Administrative" command, there is a sub-menu that contains the "User Accounts…" command. This is written as "Administrative > User Accounts."
- **SMS/SMS-3000**—This version of the System Manager Software is named SMS-3000. However, throughout this bulletin, we'll refer to the software as SMS.

Online Help System

SMS provides an online help system to aid you in using the program. To view an index of help topics, click F1 or click Help > SMS 3000 Help on the SMS main menu. The Help Topics window displays. You can access help information through three tabs:

- The **Contents** tab lists information in "books." These books are listed in logical sequence (for example, "Getting Started," "Setting Up Your System," and "Going Online with your System." Each book contains chapters that break down the information into the procedures.
- The **Index** tab lists topics in alphabetic order. Double-click the topic you want to view.
- The **Find** tab uses "key words" to search for information. The Find option uses a Windows database that includes all key words in the help system.

About SMS

SMS-3000 is a client/server PC-based software package that provides real-time circuit information from POWERLOGIC Circuit Monitors, MICROLOGIC circuit breakers, Model-85 transformer temperature controllers, and other compatible devices. SMS provides comprehensive information at a single computer or at multiple personal computers.

Something for Everyone

SMS provides useful information to anyone involved with the efficiency, reliability, cost, or operation of an electrical distribution system. Plant engineers, maintenance personnel, machine operators, and many others can benefit from this powerful, easy-to-use software without extensive software training. Whether your goal is to minimize energy usage, avoid peak demand levels, analyze equipment loading, or simply keep your electrical system up and running, SMS provides the information you need in the format you want.

The Flexibility of Microsoft Windows

SMS takes full advantage of the powerful graphical environment of the Microsoft Windows multi-tasking environment. Commands are entered by simple point-and-click operations or keyboard entry.

Since the SMS software package is specifically designed as a Microsoft Windows multi-tasking environment, it can run concurrently with spreadsheet, database, word processing, or other Windows applications. This allows the program to log data, check for alarm conditions, and more while you work in another application. If system conditions should go outside user-defined operating limits, SMS notifies the operator so action can be taken.

The powerful networking ability of Microsoft Windows lets you perform multi-tasked procedures with speed and accuracy. Using NT, SMS can access power information and distribute it wherever it is needed. Clients are not limited to a single machine: clients can reside with the server or any other PC within your LAN. The Microsoft Remote Access Services makes it much easier for you to access the system from any remote location.

Variety of Display Formats

SMS provides a wide variety of display formats. These include:

- instantaneous data tables
- function tables
- historical data tables
- bar charts
- analog meters
- time trend plots
- waveform plots
- custom tables
- event history/alarm history
- active alarms
- interactive diagrams
  (requires Interactive Graphics Client—GFX-1000 add-on module)

Data Logging

SMS can log historical data to a computer hard disk. To allow complete flexibility, you define the time interval between log samples. You can view logged data in a history table or as a time trend plot.

CM-2000 onboard data can be auto-uploaded. SMS offers predefined log templates. You can also define your own log templates with their own quantities and intervals.

Report Generation

SMS allows you to generate reports for a variety of information, and to print the reports at regular intervals. SMS offers the additional flexibility to customize reports as necessary.

Alarms

SMS allows you to define alarms based on an analog quantity (such as current, voltage, or power factor), or on a digital quantity (such as a status input or relay output). Alarms may be assigned one of ten severity levels and any of three types of indication — audible, visual, and/or required acknowledgment. When alarms occur, SMS notifies you immediately and logs the occurrence in the Alarm Log. An alarm window allows you to view a summary of active alarms at any time. You have the additional option of performing an e-mail or launching a programmed task (such as sending a message to a specific system user when an alarm occurs). SMS integrates and automatically uploads onboard event logs from Series 2000 Circuit Monitors into one central alarm log.

Event Logging of System Information

The Event Log file is constantly updated and can be viewed, printed, or cleared at any time, from anywhere on the network or from remote access. The log includes operator activities such as changing setup, resets, and placing the system online or offline. The number of events recorded is limited only by disk space.

Remote Control

SMS allows manual control of circuit monitor relay outputs and other SY/MAX compatible devices. Using this feature, you can apply and operate control options using SMS. Password entry is required to perform control operations. You must configure circuit monitor relay outputs at the circuit monitor

Share Data with Other Applications

SMS provides a powerful export feature that lets you export data in a variety of file formats. You can then import these data files into the appropriate application for additional analysis. Included in SMS is the Dynamic Data Exchange (DDE) module, which enables SMS to dynamically export data to other Windows applications.

Network Communications

SMS can use a variety of backbone network options. These include Square D's SY/NET network, TCP/IP-based networks, or combinations as applications require. The SY/NET network offers a variety of communication options including local and remote access, multi-user access, and speeds up to 500 kbaud. It supports virtually limitless connections of power monitoring and control devices and is designed for industrial applications.

For Ethernet-TCP/IP networks, POWERLOGIC Ethernet Gateways provide the best networking performance and allow use of existing TCP/IP networking technologies, including the Internet. When used with Ethernet-TCP/IP networks, SMS can be used in a client/server arrangement to provide users (clients) real-time and historical information as needed.

Technical Support

When you register your software, you are entitled to 6 months of free technical phone support. If you have any questions about this instruction bulletin, or other POWERLOGIC products, contact the POWERLOGIC Technical Support Center.

Hours are Monday—Friday, 7:30 AM–4:30 PM (CST). The fax number is available seven days a week, 24 hours a day.

Phone: (615) 287-3400

Fax: (615) 287–3404

Before you call, have the product serial number ready. The serial number is located on the label of your original program diskettes.

What You Should Know Before You Begin

This manual assumes that you:

- know how to use Microsoft Windows NT
- are familiar with Windows terminology
- know how to use a mouse and are familiar with mouse terminology, such as "pointing" and "clicking"
- have already successfully installed SMS (see the *SMS-3000 System Administrator's Guide*, chapter 4)

If you need help using Windows or a mouse, refer to the Microsoft Windows documentation.

Start With the SMS-Info.txt File

Read the SMS-INFO.TXT file included on the program diskette before you install System Manager. You can open this file using any program capable of reading a standard ASCII text file, such as the Notepad program included with Windows. This file contains important installation tips.

System Requirements

The following table lists the minimum system requirements. Specifications in brackets "[]" are recommended for superior performance. The hard disk requirements for Windows, a swap file, the software, and logging memory should also be considered when choosing a computer.

Minimum System Requirements

	Windows NT/95	
	SMS-3000 PMX-1500 SMS-1500 SMS-121①	**SMS-1000 PMX-1000 GFX-1000**
Operating System	Windows NT	Windows NT Windows 95
Display Mode	VGA (recommend Super VGA)	VGA (recommend Super VGA)
Model	Pentium	486/66 (recommend Pentium)
RAM	32M	32M
Hard Disk	500M②	500M②
Program Size	15M	8M
SY/LINK Card	optional	
RS-232 Port	③	
Network Card	③	③
Modem	14.4 or 28.8 (optional)	
Sound Card	optional	optional
3.5" Drive	③	③
CD Drive	recommended	recommended

① System Manager One-To-One (SMS-121) uses the serial port to communicate, so the SY/LINK requirements listed in the table do not apply.

② The amount of memory on the hard disk depends on whether logging data is stored on the same computer.

③ Required

Where to Next?

For	See Chapter
Program Installation	System Administrator's Guide
Basic System and Device Setup	3
Setting Up CM-2000 Onboard Functions	5
Setting Up Functions and Alarms	6
Resetting Device Data	11
Displaying On-Board Log Files	17
Creating and Executing Control Outputs	13
Displaying Waveforms	12
Displaying Real-Time Data (meters, bar charts, tables)	4
Displaying Historical Data (history tables, trend plots)	10
Using Tasks to Automate Processes	7
Viewing Alarms and Events	8
Setting up Data Logging (devices without onboard memory)	9
Creating and Printing Reports	14
Performing Diagnostics	17
Customizing Software	16
Using Dynamic Data Exchange	18

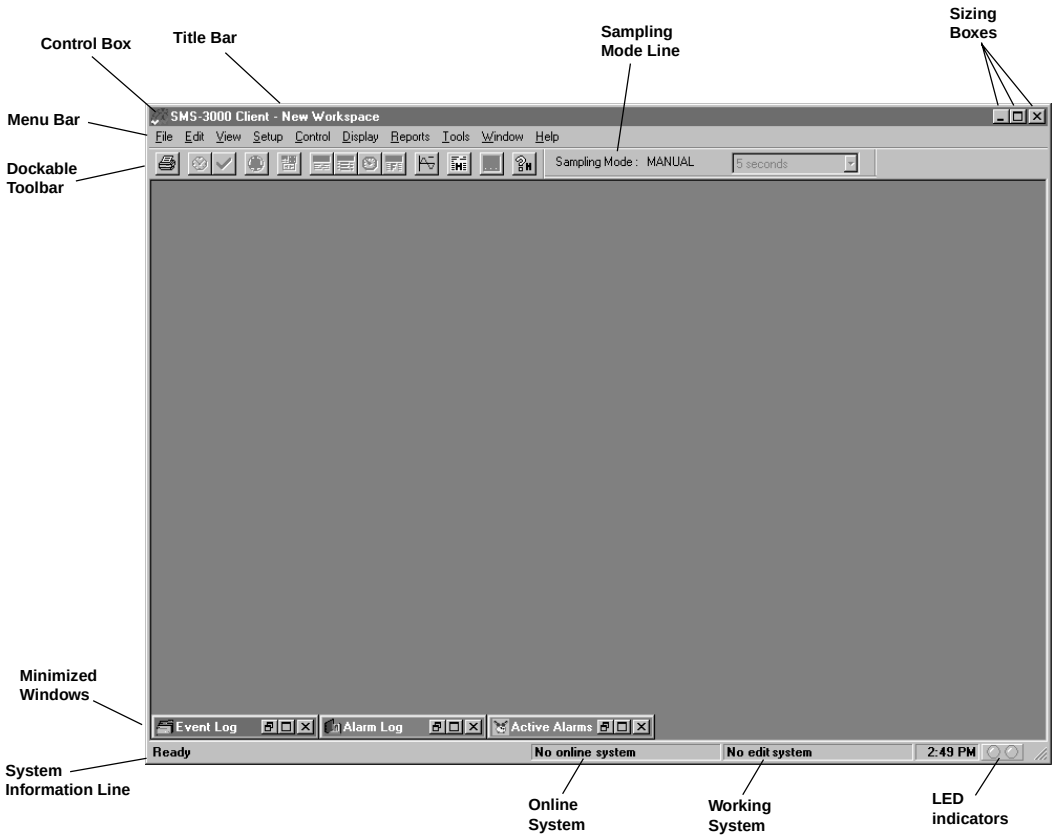
Chapter 2—The SMS Interface

Logging on to the System

Before you can log on to SMS, you must first start the server and client. If you are not sure how to do this, see **SMS-3000 Startup** in chapter 4 of the *SMS-3000 System Administrator's Guide***.**

If SMS has lost communication with a device, or if device setup information has been changed so it does not match the SMS setup information, the System Device Status dialog box displays. The procedures for bringing devices and SMS back into communication are covered in **Chapter 17—Diagnostics**.

SMS displays the SMS client main window:



The Online System

If this computer has been logged on before, and there was an online system when SMS was last closed, that system will still be online. The ONLINE field at the bottom of the window displays the system name.

If this is the first time this computer has logged onto SMS, or if there was no online system the previous time, this field reads *No online system*. Going online and offline is discussed in **Chapter 3—Basic System Setup and Operation**.

The Working System

The working system, sometimes called the edit system, is the system that is open for editing (changing device configurations, defining functions, etc.). SMS can be online to one system while you are editing another system. You need to open a working system only when you want to change device or system setup information.

The working system name displays to the right of the online system, at the bottom of the screen. When you first log on, there will be no working system. The procedure for opening a working system is covered in **Chapter 3—Basic System Setup and Operation**.

Parts of a Window

SMS is completely interactive, using descriptive menus for all program functions. The program takes full advantage of the powerful graphics-oriented Microsoft Windows interface.

The SMS main window is shown on the previous page. A description of the main window follows.

Control Box. The Control Box has seven commands which involve resizing, moving, closing, and switching to other Windows applications.

Menu Bar. The Menu Bar displays all of the pull-down menus available in an application. Each menu item can be accessed either by clicking on a menu item name or by holding the ALT key down and then pressing the key that corresponds to the underlined letter in the menu item name. Once the menu is open, choose a command either by clicking the command name or by pressing the key that corresponds to the underlined letter in the name.

Parts of a Window (cont.)

Title Bar. The Title Bar displays the name of the application or window. You can display more than one window at a time, but only one of them can be active. To avoid confusion, the title bar of the active window is a different color than the rest of the windows on the screen. To activate a window, you can do one of two things:

- click the window to bring it to the front
- from the Window menu, click the name of the window to be displayed

Sizing Boxes. Click these boxes to minimize/maximize the active window, or to close the window.

Toolbar. The toolbar includes two parts, the toolbar icons and the sampling mode line. Each of these parts is "dockable," meaning the user can click on it and move it to various positions on the screen (for example, along the left side).

- The **Toolbar Icons** allow you to access commands more quickly by simply clicking on an icon. The icons correspond to commands in the pull down menus. For a description of each icon and its use, see **Parts of the Toolbar** later in this chapter.
- Use the **Sampling Mode Line** to set the rate at which SMS updates and displays new real-time data (such as meter displays). .

List Box. A list box displays a list of selections. You can choose one item in the list. To use, click the arrow button (the list drops down), then click an item from the list to select it.

List. A list displays the available selections. You can usually select more than one item from a list.

- **Tree Structure Lists.** Many lists in SMS (for example, lists of groups with their devices), are compressed when first viewed: you can see only the first level. To expand the tree structure, click the "+" beside first level entry; the "+" changes to a "–" and the second level entries display. To close the tree, click the "–."
- **Add and Delete Buttons**. Many dialog boxes allow you to add or delete information from lists. To add or delete a single item, click the item name, then click ">" to add or "<" to delete. To add or delete the entire list, click " >>" to add all or "<<" to delete all.
- **Drag-and-Drop**. Another way to move or copy an item from one list to another. To use this feature, click an item in the list; still holding the mouse button, drag the item to the other list. Let go of the mouse button to complete the move.

Edit Box. In an edit box, you type your own value (unlike the list, from which you must select a predetermined value). To enter a value in an edit box, click the box, then type the value.

Minimized Windows. Use minimized windows to display the SMS logs (such as the Event Log) that have been reduced or minimized. To restore the log to its original size, click the middle sizing box of the corresponding minimized window.

System Information Line. The System Information Line indicates several things:

- When you pull down a menu and move the pointer over a command, SMS displays text that describes the command.
- The online system displays in the middle of the line. This is the SMS system for which you are currently displaying data.
- The working system (the system for which system setup data can be entered) displays to the right of the online system. You need to open a working system only when you want to make setup changes to that system.

Option Buttons. Click option buttons to make selections within dialog boxes. Only one option button for each choice can be selected at a time.

Check Box. Click the check boxes to make multiple selections in a dialog box. Unlike option buttons, you can select as many check boxes as you like in each dialog box.

Named Push Buttons. Push buttons are used to confirm, cancel, or perform other functions in dialog boxes. In many cases, clicking a push button will cause you to exit the dialog box containing that push button. Each push button is referred to by its name only. For instance, the instructions will say “Click Add,” not “Click the Add button.”

LED Indicators. The LED Indicators are two colored “lights” that alert you to the status of communications activity. The left-hand light flashes to indicate the health of the POWERLOGIC network server communication; when flashing, the client is communicating with the server. The right-hand light flashes to indicate that the alarm/event manager is communicating.

Parts of the Toolbar

To access commands quickly, click on a toolbar icon. Each icon corresponds to a command in the menus. The toolbar is shown on the first page of this chapter. A description of each icon follows.

Note: *When SMS is offline, most of the toolbar icons are grayed out (disabled). To activate the icons, go online using the "Online" command in the File menu. The Diagrams icon is only active when you have installed the Interactive Graphics add-on module.*

Icon	Name	Function
	**Print**	Prints the window that is currently displayed.
	**Scheduled Update**	Toggles from "Scheduled Update" to "Manual Update" sampling mode.
	**Take Sample**	Takes a single data sample when in "Manual Update" mode.
	**Silence All Alarms**	Silences all active audible alarms until the next alarm occurs.
	**Open Workspace**	Opens the "Workspace" dialog box to open a previously defined workspace.
	**Display Tables**	Opens the "Tables" dialog box to display real-time tables.
	**Display Bar Charts**	Opens the "Bar Charts" dialog box to display real-time bar charts.
	**Display Meters**	Opens the "Meters" dialog box to display real-time meter panels.
	**Function Tables**	Opens the "Function Tables" dialog box to display the status/condition of digital and analog functions.
	**Display Waveform Plots**	Opens the "Waveform Plots" dialog box to display system voltage and current waveforms.
	**Historical Data**	Opens the "History Tables" and "Time Trend Plots" dialog box to display history tables and time trend plots from the history log file.
	**Display Diagrams**	Opens the "Diagrams" dialog box to display diagrams created with POWERLOGIC Interactive Graphics software.
	**Help**	Invokes context-sensitive help with *how-to* and *example* screens.

Chapter 3—Basic System Setup and Operation

SMS supports and communicates with several types of devices. (See chapter 1 for an overview of device support.)

- **Circuit Monitors**. Series 100/200 and Series 2000. See circuit monitor instruction bulletin you received with your equipment for the features and capabilities of your circuit monitor(s).
- **POWERLOGIC Power Meter**. Compact meter for basic industrial power monitoring. See power meter instruction bulletin for features and capabilities.
- **POWERLOGIC Digital Relay**. Three-phase and ground overcurrent protection for application on medium voltage circuit breakers.
- **POWERLOGIC Trip Unit** for low voltage power circuit breakers (Digitrip RMS810D).
- **MICROLOGIC Circuit Breakers**. Square D molded case circuit breakers with the MICROLOGIC full-function trip system and the "PIF-3" product interface to POWERLOGIC.
- **Model 85 Transformer Temperature Controller**. Life-Gard Model 85A Transformer Temperature Controller with "PIF-85" product interface to POWERLOGIC; for Square D PowerCast or conventional dry-type power transformers.
- **POWERLINK AS Remote Power Switching System**. Lighting control for Square D NQOD or NEHB panelboards.
- **POWERLOGIC Compatible Devices**. Other devices used with custom quantities to create a custom device type. This device type allows you to communicate with devices that are compatible with POWERLOGIC devices (the quantities for monitoring the device must be manually defined):
  - **SY/MAX programmable logic controller (PLC) or SY/MAX compatible device**
  - **other third party devices with compatible protocol**

POWERLOGIC Metering Device Models

POWERLOGIC metering device models contain some or all of the features shown in the table below. The device model determines which features are active in SMS.

It is important to know which features your device model supports as you use SMS, especially when setting up a Series 2000 circuit monitor. Refer to this table to identify which features apply to your system.

Metering Device Feature Comparison

	Series 100				Series 200				Series 2000					Power Meter	
Feature	**CM100**	**CM108**	**CM144**	**CM150**	**CM200**	**CM208**	**CM244**	**CM250**	**CM2050**	**CM2150**	**CM2250**	**CM2350**	**CM2450**	**PM600**	**PM620**
Full Instrumentation	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Front Panel LED Display				X				X	X	X	X	X	X	@	@
RS-485 Comm Port	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Front Pnl Optical Comm Port								X	X	X	X	X	X		
1% Accuracy Class	X	X	X	X	X	X	X	X	X						
0.2% Accuracy Class										X	X	X	X		
0.3% Accuracy Class														X	X
Status Inputs		8	4			8	4		#	#	#	#	#		
Relay Outputs			4				4		#	#	#	#	#		
Analog Inputs									#	#	#	#	#		
Analog Outputs									#	#	#	#	#		
On-board Relay Functions										X	X	X	X		
On-board Data Logging										X	X	X	X		
Downloadable Firmware										X	X	X	X	X	X
Date/Time for each Min/Max										X	X	X	X		
4-Cycle Waveform Capture					X	X	X	X			X	X	X		
Extended Waveform Capture												X	X		
Extended Memory												X	X		
Sag/Swell Detection												X	X		
CM Programming Language													X		

@ Optional

Hardware Input/Output Module required. Refer to **Input/Output Modules for Series 2000 Circuit Monitors** on the next page for more information on I/O Modules.

Input/Output Modules for Series 2000 Circuit Monitors

The following table presents the various Class 3020 input/output modules available for Series 2000 Circuit Monitors.

Class 3020 Input/Output Modules

Type	Description
IOM-11	1 status IN, 1 KYZ pulse OUT
IOM-18	8 status IN, 1 KYZ pulse OUT
IOM-44	4 status IN, 1 KYZ pulse OUT, 3 Form-C relay OUT
IOM-4411-01	4 status IN, 1 KYZ pulse OUT, 3 Form-C relay OUT, 1 Analog IN①, 1 Analog OUT (0–1 mA)
IOM-4411-20	4 status IN, 1 KYZ pulse OUT, 3 Form-C relay OUT, 1 Analog IN①, 1 Analog OUT (4–20 mA)
IOM-4444-01	4 status IN, 1 KYZ pulse OUT, 3 Form-C relay OUT, 4 Analog IN①, 4 Analog OUT (0–1 mA)
IOM-4444-20	4 status IN, 1 KYZ pulse OUT, 3 Form-C relay OUT, 4 Analog IN①, 4 Analog OUT (4–20 mA)

① Analog inputs are 0–5 Vdc. Each analog input can be independently configured to accept a 4–20 mA input by connecting an external jumper wire.

Minimum Setup Requirements

There are several setup procedures that must be completed before SMS can communicate to devices. Each of these procedures establishes important file information that SMS uses to process data. The setup procedures are:

- Creating a new system
- User account setup
- PC interface setup
- Device and route setup

The remainder of this section discusses each of these setup procedures in detail. Also included in this section are instructions for going online and offline, and setting the sampling mode (the interval at which SMS takes data samples for such things as real-time tables and meters).

Creating a New System

Creating a new system means you create a logical name for the collection of devices that you will be defining. Before you can use a system, you must first fill it with system configuration information, such as PC interface (SY/LINK or serial), device routes, and device configuration information.

For flexibility, you may choose to have multiple systems. Data from all systems is stored in the SMS-3000 database, though each system will have its own device data. All systems share the same user account setup.

Creating a New System (cont.)

Follow these steps to create a new system file.

1. On the SMS main menu, click File > New > System.
   The New System dialog box displays:

2. Type a unique System Name (50 alphanumeric characters).

3. Click OK.

The system name is added. Note that this new system becomes the working system. The system name is displayed at the bottom right of the screen after the word EDIT.

At this point, you might want to add new user accounts. The administrator account was added when SMS was installed, but a unique account should be created for each person who will use the system. For help setting up new user accounts, see chapter 5 of the *SMS-3000 System Administrator's Guide*.

Setting Up The PC Interface

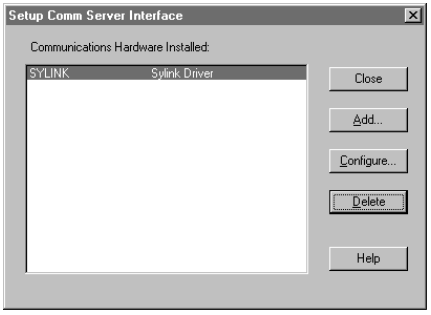
Your computer's communications interface to POWERLOGIC devices can be either a SY/LINK Network Interface Board or one of the serial ports on your machine. The SY/LINK board requires that your computer have an "AT" bus structure and a spare long expansion slot.

Adding a New PC Interface

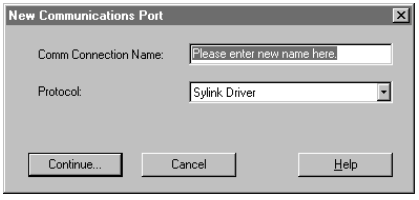
Before you can establish a PC interface, you must take the system offline. The first step in establishing a new PC interface is adding the interface, defining the name and interface type (SY/LINK or RS-232).

Follow these steps to add the PC interface:

1. On the SMS main menu, click Setup > PC Interface… .
   The Setup Comm Server Interface dialog box displays:



2. Click Add to display the New Communications Port dialog box:



3. Type a unique name for the communication connection, up to 31 characters, such as SY/LINK CARD. This name will be assigned to this SY/LINK card when it is referenced in later system operations.

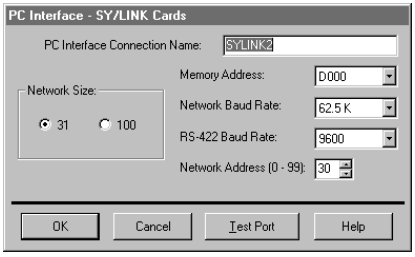
4. Select an interface type from the Protocol pulldown box:
   - **DDE Requestor** to set up communication between SMS and the Dynamic Data Exchange (DDE) application
   - **SY/LINK Driver** to set up communication for a SY/LINK card
   - **SY/MAX RS-232 Driver** to set up serial communication

   You can have multiple SY/LINK cards in a computer, but you must follow the complete setup procedure for each card.

5. Click Continue to proceed with setup. For each type of setup—DDE Requestor, SY/LINK Board, or SY/MAX RS-232—see the appropriate section in the following paragraphs.

SY/LINK Board Setup

If you chose the SY/LINK driver protocol in step 4 of the procedure on the previous page, SMS displays the PC Interface - SY/LINK Cards dialog box:



To set up the SY/LINK board, enter the appropriate information in each step below.

1. The **PC Interface Connection Name** displays the default name entered on the previous dialog box.

2. **Memory Address.** This is the SY/LINK memory address. This value tells SMS which memory address range the SY/LINK board will use. The memory address range is set by a group of DIP switches located on the SY/LINK board. The address that appears in this dialog box was entered during SMS-3000 installation. It must match the SY/LINK board's DIP switch setting. The SY/LINK board's default switch setting is CA00. Unless you changed the DIP switches on the SY/LINK board and during installation, CA00 displays here.

3. **Network Baud Rate.** This sets the baud rate of the SY/LINK board's network port. This value must match the baud rate of all other network devices (NIMs, PNIMs, and SY/LINK boards) on the network.

4. **RS-422 Baud Rate.** This sets the baud rate of the SY/LINK board's RS-422 port. This value must match the baud rate of the device connected to the SY/LINK board's RS-422 port. For example, if the device connected to the RS-422 port is set to 9600 baud, then choose 9600 here.

5. **Network Address**. This sets the network address of the SY/LINK board. If the "Network Size" (described in step 6) is 100, then this value must be an integer from 0–99. If the "Network Size" is 31, then this value must be an integer from 0–30. Each network device on a common network must be assigned a unique network address. For example, a SY/LINK board *cannot* have the same address as a PNIM on the same network.

6. **Network Size.** This number indicates the maximum number of network interfaces (SY/LINK boards and NIMs) on a single network. If the network contains 31 or fewer network interfaces, select 31. If the network contains more than 31 network interfaces, select 100. This number must match the DIP switch settings on all PNIMs to enable communication.

7. Click Test Port.

   If the test fails, examine the Memory Address box to verify that you have selected the correct SY/LINK memory address. The address selected in the Memory Address list box must match the SY/LINK board's DIP switch setting. If the test still fails, open your computer and check the DIP switch setting on the SY/LINK board. If the setting is correct, either the SY/LINK board is bad, or the PC has already allocated memory in this location or another device is using the location.

   If no address appears in the Memory Address box, start the Smscfg program located in the /SMS-3000/BIN directory, then click the SY/LINK tab and enter the memory address that matches the SY/LINK board's DIP switch setting. Restart the PC to cause the changes to take effect.

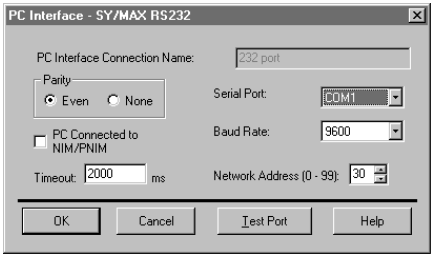
8. When you have updated all items, and the memory address test has passed, click OK to return to the Setup Comm Server Interface dialog box. Click Close to return to the SMS main window.

9. Repeat the steps for any additional SY/LINK card(s) or click Close to return to the SMS main window.

   To add SY/LINK cards, you must use the Smscfg utility. Remember to restart the PC.

SY/MAX RS-232 (Serial) Port Setup

After selecting SY/MAX RS-232 Driver in step 4 and completing step 5 in Adding a New PC Interface, SMS displays the PC Interface - SY/MAX - RS232 dialog box:



To set up serial communications, complete the following steps:

1. **Parity**. Click Even or None to match the parity of the devices to which you are connecting.

2. **Serial Port**. Click the port to which the cable is attached.

SY/MAX RS-232 (Serial) Port Setup (cont.)

3. **Baud Rate**. Click the baud rate that the serial port will use. This value must match the baud rate of all other devices on the network.

4. **PC Connected to NIM/PNIM**. If the PC is connected to a NIM or PNIM, check this box.

5. **Timeout**. Enter the amount of time SMS waits before retrying to communicate with the devices. Default 5000 msec.

6. **Network Address**. This sets the network address for the PC on which the POWERLOGIC network server is installed. This value must be an integer from 0–99. Each network device on a common network must be assigned a unique network address. For example, a PC *cannot* have the same address as a PNIM on the same network.

7. To test the port, click Test Port. This ensures that the communications port passes the system's internal test. If the test fails, examine the Network Address box to verify that you have selected a valid number.

8. Click OK to return to the Setup Comm Server Interface dialog box.

Setting Up Devices and Routes

1. Adding a Device

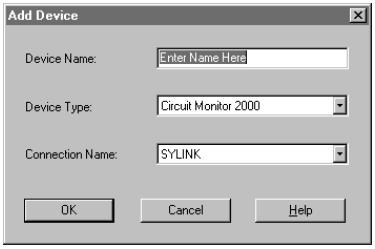
You must set up a PC interface (see previous section) before you can add a device. You can add devices when online or offline.

Note: *DDE device setup is described in* ***Chapter 18 — Using Dynamic Data Exchange (DDE)****. See chapter 18 for instructions on setting up a DDE device.*

On the Setup menu, click Devices/Routing… to display the Device Setup dialog box. This dialog box lists all previously defined devices along with their device types and routes. Follow these steps to add and route a device.

Note: *You can sort the information in this box, listing it in an order that is convenient for you. To sort, click the title bar (Device, Type, or Route).*

To add a new device, click Add to display the Add Device dialog box:



Add the following device information:

Add Device table

At this field…	Do this…
1. **Device Name:**	Type a descriptive name for this device, maximum 32 characters, no apostrophes; for example, *Stamping Line Feeder 1.*
2. **Device Type:**	Click the type of device you are adding.
3. **Connection Name:**	Click the PC port to which this device connects. The connection name is the name you assigned when adding the new PC port.

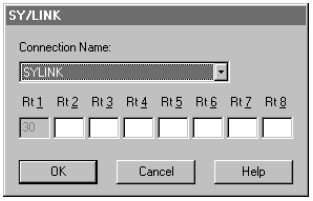
Click OK to save the device information you just typed.

2. Adding a Route

A route statement defines the path from the personal computer to one specific device. You must assign a unique route statement for each device in a POWERLOGIC system. Route statements are stored in the SMS database, along with the rest of the setup information.

Adding a SY/LINK Route

1. After you add a device with a SY/LINK connection name, SMS displays the SY/LINK dialog box:



2. Add the SY/LINK route information:

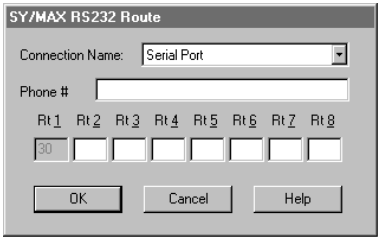
Add SY/LINK table	
At this field…	**Do this…**
1. **Connection Name:**	SMS displays the name of the PC port to which this device connects. This name was established when adding the device.
2. **Rt1–Rt8:**	Enter the route. For help in creating routes, refer to the *Power Monitoring and Control System Planning Guide* (order no. 3000CT9601).

3. Click OK to save the route information and return to the Device Setup dialog box.

The information entered to this point allows you to access information collected from devices. However, you can perform additional setup that you would otherwise perform at the device. This feature allows you to set up devices from one PC, within SMS, rather than having to waste time entering setup information at each device. For this setup information, see **Additional Device Setup**, later in this chapter.

Adding a Serial Port Route

1. After you add a device with an RS-232 (serial port) connection name, SMS displays the SY/MAX RS232 Route dialog box:



2. Add the serial port route information:

Add Serial Port table	
At this field…	**Do this…**
1. **Connection Name:**	SMS displays the name of the PC port to which this device connects. This name was established when adding the device.
2. Phone #:	Enter the phone number for auto-dial applications (allowing SMS to automatically poll remote devices). Include any characters that must be entered when connecting with the modem. If you must enter a '9' to get an outside line, enter the '9' here. If you need to allow for a delay getting an outside line, enter a comma (,) for each second of delay time. You can enter the phone number with dashes. If you are connecting to an internal extension, enter only that extension. An example of an outside connection is *9,,555-1212* (using '9' to get an outside line and two commas for a two-second delay).
3. **Rt1–Rt8:**	Enter the route. For help in creating routes, refer to the *Power Monitoring and Control System Planning Guide* (order no. 3000CT9601).

3. Click OK to save the route information and return to the Device Setup dialog box.

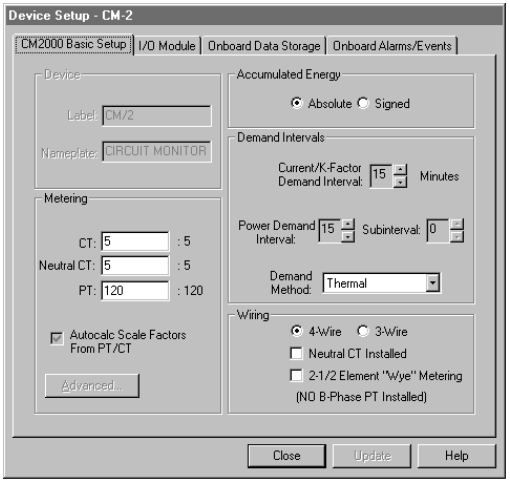
The information entered to this point allows you to access information collected from devices. You can perform additional setup that you would otherwise perform locally at the front panel of that device. This feature allows you to set up devices from one PC, within SMS, rather than having to waste time entering setup information at each device. For this setup information, see **Device Setup**, below.

3. Device Setup

To perform device setup, click the device name, then click Configure (or double-click the device name). The appropriate dialog box displays, depending on the device type you selected. For example, if you click a Series 2000 Circuit Monitor, you will see a Device Setup dialog box that allows you to enter Series 2000 Circuit Monitor data. The setup for each device type is described in the following pages.

Series 2000 Circuit Monitor Setup

After you select the CM-2000 device type, SMS displays the CM2000 Basic Setup tab (after you establish the route):



Follow the steps below to set up the CM 2000 series circuit monitor.

CM2000 Basic Setup table

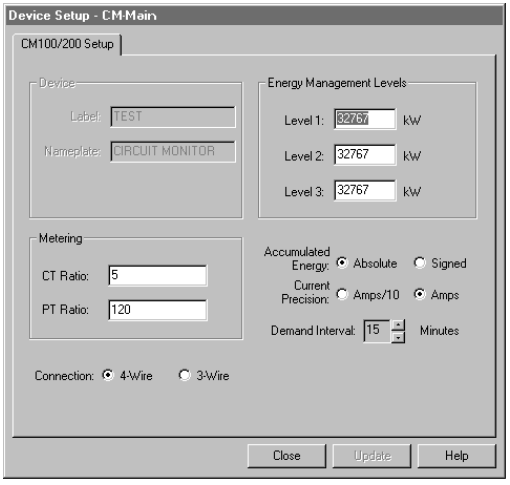
At this field…	Do this…
1. Label:	Enter a 1- to 4-character alphanumeric label to identify the circuit monitor. The label typically is different for each circuit monitor; it is used for system displays. This is *not* the device name, which is defined using the “Routing” command. SMS displays the device *name*, not the *label*, when listing devices.
2. Nameplate:	Enter a 1- to 16-character alphanumeric nameplate. Most commonly associated with the monitored circuit, the nameplate should reflect that connection. For example, if the circuit monitor is monitoring a welder on line 3, the nameplate might be “Welder Line 3.” SMS uses this name for system displays.
3. CT:	This is the primary turns ratio of the current transformers (CTs) supplying the circuit monitor with current inputs. Enter the “CT Ratio” in terms of X:5A. For example, if the CT ratio is 500:5, enter 500.
5. Neutral CT:	This is the primary turns ratio of the neutral CT. Enter the “Neutral CT Ratio” in terms of X:5A. For example, if the neutral CT ratio is 50:5, enter 50.
6. PT:	This is the primary turns ratio of the potential transformers (PTs) supplying the circuit monitor with the voltage signals. Enter the “PT Ratio” in terms of X:120V. For example, if the PT ratio is 288:120, enter 288.
7. Automatic Scale Factors From PT/CT	SMS uses this feature to automatically create scale factor ratios for PT/CT/Neutral numbers entered by users. Default = enabled. If you disable this feature, click Advanced to enter ratios manually.
8. Accumulated Energy	Circuit monitors can accumulate energy in two modes: absolute or signed. In “absolute,” the circuit monitor accumulates energy based on the absolute value of real power, regardless of the direction of power flow. In “signed,” the circuit monitor accumulates energy with regard to sign; that is, for reverse power flow, the accumulated energy value is reduced.

At this field…	Do this…
9. Current/K-Factor Demand Interval	Used in the average current and K-factor demand power calculations for Series 2000 Circuit Monitors. Enter a value between 5 and 60 in 5-minute increments (5, 10,…60). Default is 15.
10. Power Demand Interval	Used in the average demand power calculations. Enter a value between 5 and 60 in 5-minute increments (5, 10, 15,...60); the default is 15 minutes. You can also enter a zero, which causes the circuit monitor to look to status input S1 on the optional attached Input/Output Module for an external synchronizing pulse for its "block interval" (described below) demand method calculation. This sync pulse input is commonly used to ensure that the circuit monitor is in sync with a utility watt-hour meter and can be used to verify the utility's peak demand charges.
11. Subinterval	Used only when the demand method (below) is "block," to determine the start point for each new interval. Enter a value between 0 and 60 in 5-minute increments (this value must be evenly divisible into the value entered in step 10). A setting of 0 yields a 15-second continuous sliding subinterval (starting a new interval every 15 seconds). A setting of 5 minutes or greater yields a rolling block subinterval (starting a new interval every 5 minutes).
12. Demand Method	This box displays the circuit monitor methods for calculating demand power: **Thermal (default).** The only method available for Series 100/200 Circuit Monitors. This method calculates demand based on a thermal response and updates its demand calculation every 15 seconds on a "sliding window" basis. The interval can be from 5 to 60 minutes in 5-minute increments. **Block.** Applies to Series 2000 Circuit Monitors only. The "Block" demand method calculates demand based on a fixed block of time equal to the demand interval selected (5 to 60 minutes in 5-minute increments). The demand calculations are performed at the end of the interval so the demand values displayed are the values for the last completed demand interval. **Sync to S1.** Applies to Series 2000 Circuit Monitors only. This method is equivalent to setting the demand interval to zero (step 10). This sync pulse input is commonly used to ensure that the circuit monitor is in sync with a utility watt-hour meter and can be used to verify the utility's peak demand charges. **Sync to Comms.** Applies to Series 2000 Circuit Monitors only. The circuit monitor uses the "Start of Interval" command received over the RS-485 communications chain from an external source, such as a programmable logic controller (PLC).
13. Wiring	Click to select: • **4-Wire** if the circuit monitor is wired in a 3-phase, 4-wire system • **3-Wire** if the circuit monitor is wired in a 3-phase, 3-wire system • **Neutral CT Installed** if a neutral CT is connected • **2-1/2 Element "Wye" Metering** if the circuit monitor is wired in a 3-phase, 4-wire system and there is no B-phase PT installed

When you've entered all the information in this tab, the setup for basic operation of the CM-2000 series circuit monitor is complete. Advanced circuit monitor information is contained in the remaining three tabs of this dialog box. For instructions on advanced setup of the CM-2000 series circuit monitor, see **Chapter 5—Advanced On-Board Setup for Series 2000 Circuit Monitors**.

Series 100/200 Circuit Monitor Setup

When you select the Circuit Monitor 100/200 type, the Device Setup dialog box displays (after you establish the route):



Follow these steps to set up the CM 100/200 series circuit monitor:

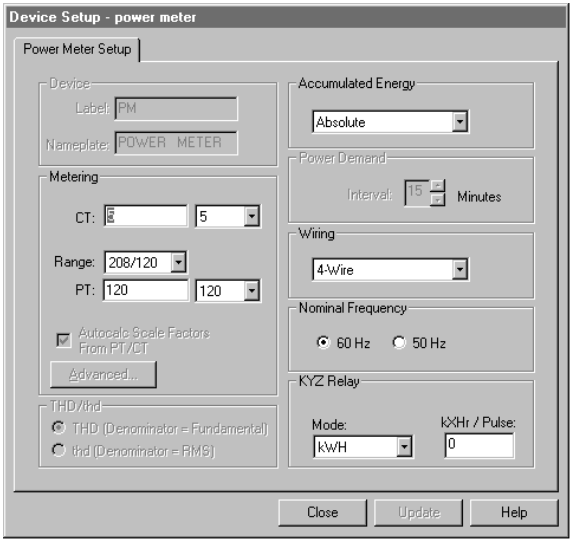
CM 100 Series Setup table

At this field…	Do this…
1. **Label:**	Enter a 1- to 4-character alphanumeric label to identify the circuit monitor. The label typically is different for each circuit monitor; it is used for system displays. This is *not* the device name, defined using the “Routing” command. SMS displays the device *name*, not the *label*, when listing devices.
2. **Nameplate:**	Enter a 1- to 16-character alphanumeric nameplate. Most commonly associated with the monitored circuit, the nameplate should reflect that connection. For example, if the circuit monitor is monitoring a welder on line 3, the nameplate might be “Welder Line 3.” SMS uses this name in systen displays.
3. **Energy Management**	The circuit monitor provides three independent “Energy Management Alarm” levels for comparison with computed Real Power Average Demand values. These are alarms levels ranging from 0 to 32,767 kW. If you do not have the POWERLOGIC Product Communications Software (PSW-101), do not change the default entries.
4. CT Ratio	This is the primary turns ratio of the current transformers (CTs) supplying the circuit monitor with current inputs. Enter the “CT Ratio” in terms of X:5A. For example, if the CT ratio is 500:5, enter 500.
5. PT Ratio	This is the primary turns ratio of the potential transformers (PTs) supplying the circuit monitor with the voltage signals. Enter the “PT Ratio” in terms of X:120V. For example, if the PT ratio is 288:120, enter 288.
6. **Accumulated Energy**	Circuit monitors can accumulate energy in two modes: absolute or signed. In “absolute,” the circuit monitor accumulates energy based on the absolute value of real power, regardless of the direction of power flow. In “signed,” the circuit monitor accumulates energy with regard to sign; that is, for reverse power flow, the accumulated energy value is reduced.

At this field…	Do this…
7. **Connection**	Refers to the system wiring. Click 3-Wire if the circuit monitor is wired in a 3-phase, 3-wire system. Click 4 Wire if the circuit monitor is wired in a 3-phase, 4-wire system.
8. **Current Precision**	Determines whether all current values are returned in amps or tenths of amps (Amps/10). Select Amps/10 when greater precision is required.
9. **Demand Interval**	Used in the average demand power calculations, enter a value between 5 and 60 in 5-minute increments (5, 10, 15,...60). Default is 15 minutes.

Power Meter Setup

When you select Power Meter, SMS displays the power meter Device Setup dialog box :



Follow these steps to set up the power meter:

Power Meter Device Setup table

At this field…	Do this…
1. Label:	Enter a 1- to 4-character alphanumeric label to identify the power meter. The label typically is different for each power meter; it is used for system displays. This is *not* the device name, which is defined using the “Routing” command. SMS displays the device *name*, not the *label*, when listing devices.
2. Nameplate:	Enter a 1- to 16-character alphanumeric nameplate. Most commonly associated with the monitored circuit, the nameplate should reflect that connection. For example, if the power meter is monitoring a welder on line 3, the nameplate might be “Welder Line 3.” SMS uses this name in system displays.
3. CT:	This is the turns ratio of the current transformers (CTs) supplying the power meter with the current inputs. Enter the primary and select the secondary. For example, for a 120:5 ratio, enter 120 in the left box, and select 5 in the spin box.

Power Meter Setup (cont.)

At this field…	Do this…
4. Range:	Select the voltage range: For L-N voltage less than 150 V, select 208/120; for L-N voltage between 150 V and 346 V, select 480/277; for L-N voltage between 347 V and 433 V, click 600/347. When the L-N voltage is greater than 433 V, select 208/120 and select the appropriate PT setting.
5. PT:	This is the turns ratio of the potential transformers (PTs) supplying the power meter with the voltage signals. Enter the primary and select the secondary. For example, if the PT ratio is 120:100, enter 120 in the left box and select 100 in the spin box. You need to set this field only when the PT is 208/120 and you are using a potential transformer.
6. Automatic Scale Factors From PT/CT	SMS uses this feature to automatically create scale factor ratios for PT/CT numbers entered by users. Default = enabled. If you disable this feature, click Advanced to enter ratios manually.
7. THD/thd	(PM-620 only) This field sets the manner in which the power meter calculates total harmonic distortion. Select THD (% fundamental) for usage in the U.S., or select the alternate thd (% rms), which is commonly used in Europe.
8. Accumulated Energy	Power meters can accumulate energy in four modes: absolute, signed, in only, and out only. In “absolute,” the power meter accumulates energy based on the absolute value of real power, regardless of the direction of power flow. In “signed,” the power meter accumulates energy with regard to sign; that is, for reverse power flow, the accumulated energy value is reduced. In “in only,” the meter accumulates kWh and kVarH as energy into the load In “out only,” the meter accumulates kWh and kVarH as energy out of the load
9. Power Demand	(PM-620 only) Used in the average demand power calculations. Enter a value between 1 and 60 in 1-minute increments (1, 2, 3,...60). This creates a “sliding block” demand with the following characteristics: from 1–15 minutes, there is a 15-second subinterval; from 16–60 minutes, there is a 1-minute subinterval.
10. Wiring	Click to select: • **4-Wire** if the power meter is wired in a 3-phase, 4-wire system • **3-Wire w/2CT** if the power meter is wired in a 3-phase, 3-wire system, using 2 CTs • **3-Wire w/3CT** if the power meter is wired in a 3-phase, 3-wire system, using 3 CTs
11. Nominal Frequency	Select 60 Hz or 50 Hz, depending on the frequency of the electrical system.
12. Mode	Select the KYZ pulse to correspond with the mode you are using: kWH, kVarH, kVAH, or disabled.
13. kXHr Pulse	Disabled if the Mode is disabled. Otherwise, enter the pulse weight that corresponds with the mode you set.

Working with the System

Going Online

Before you can communicate to the devices in a system, you must load a system file. The process of loading a system file is referred to as going online. The Online command in the File menu is used to go online to a system that you have created.

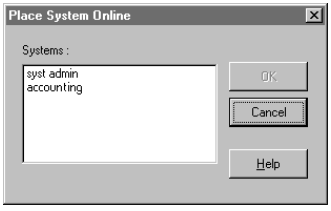
The online system is the system that all clients connected to the same POWERLOGIC network server will view. Once you place a system online, *all clients* that connect to that server will access the same database, with the same devices, logging, etc. A client cannot view another system's data unless the current system is taken offline and the new system is placed online.

Going Online with a System

To go online with a system, follow these steps:

1. Before you place a system online, the online system field, in the center of the bottom of the SMS main window, displays the message *No online system*. On the File menu, click Online > System.

   SMS displays the Place System Online dialog box:



2. Click the system name of the system you want to place online. Click OK.

   SMS displays a message telling you that the selected system is online.

Notes: *All clients connected to this server will go online with this system.*
If the server is shut down then started up, the system that was online at the time of shutdown will automatically be online. You can change the system to another, or to no online system: use the Diagnostics tab of SMS Configuration (Smscfg). This change will take effect only for the next startup.

Going Online with a Workspace

The workspace feature lets you save a snapshot of the SMS client window— such as open windows, data update mode, etc—and reload the snapshot when you go online with SMS. This gives you quicker access to dialog boxes that you need to access often.

To go online with a workspace, you must first save a workspace (File > Save Workspace As… ; see **Chapter 16—Saving a Workspace**). Then follow these steps:

1. On the File menu, click Online > Workspace.

   The Open dialog box displays.

2. Click the name of the workspace that you want to take on line.

SMS takes the workspace on line.

Device Status Checks

When a system is placed online, SMS checks the status of each device in the system. A device will fail an SMS device status check if:

- SMS is unable to communicate with it.
- A comparison of the basic settings of the database and the device does not match; for example, something in the basic setup has been changed since the last time the device was brought online.

If one or more devices do not pass the SMS device check, the System Device Status dialog box displays. It gives you information about the working status of the system devices.

The procedures for bringing devices and SMS back into communication are covered in **Correcting Mismatches in Device Setup Data** in **Chapter 17—Diagnostics**. See this chapter for instructions on performing a system communications test and restoring communication between the system and its devices.

Opening a Working System

The working system ("EDIT" system, displayed at the bottom right of the SMS main window) is the system to which you can make changes. Only one client can open a working system at one time. Opening a working system puts SMS in edit mode, allowing you to modify setup parameters. When you first go online, there is no working system.

To open a working system, follow these steps:

1. Click File > Open > System… . The Open System dialog box displays.
2. Click the name of the system you want to open.
3. Click OK.

The working system changes to EDIT: [system name]; any changes you make apply to that system only.

Note: *While online, you cannot edit the PC interface or change device routing, but you can add devices to the system*.

Changing the Working System

To change the working system, simply open the second system. SMS closes the first system and opens the new system for you.

Closing the Working System

To close the working system, click File > Close Working System. SMS closes the working system.

Going Offline

Once you are online with a system, the *Online* command (under the File menu) changes to *Offline*. To take the online system offline, click Offline.

SMS asks you to verify the action. Click No to leave the system online; click Yes to take it offline.

Note: *When you go offline, the server stops communicating with devices. All logging, alarm monitoring, and scheduled tasks will stop. All connected clients stop receiving updates.*

If SMS is shut down, the last online system before shutdown automatically becomes the online system after startup. You can change the system to another, or to no online system: use the Diagnostics tab of SMS Configuration (Smscfg). This change will take effect only for the next startup.

Setting the Sampling Mode

After you go online with a system, you must tell SMS how often it should update the client user interface for real-time displays. Each client can set its own update rate. SMS has two sampling mode options:

- **Scheduled**. Causes SMS to sample data at a user-defined update interval.

  Notes: *The number of devices from which you are sampling data can slow this process down. For example, if you have 50 devices in your facility, SMS may take longer than 10 seconds to complete a sample. If the sample takes longer than the schedule time, SMS will return the sample information, and then immediately begin a new sample.*

  This virtually constant device polling uses up SY/NET and RS-232 resources (on the POWERLOGIC network server PC), which will slow down other SMS processes. If unattended clients are making unnecessary requests to the server, it is recommended that you stop the sampling process at these client PCs. You can either go to manual sampling mode, or close all reports and tables that are drawing information into client PCs. Alarm and event polling will continue even when in manual sampling mode.

  The scheduled mode does not control intervals for logging or alarm data to the history log or the printer. For these intervals, use the Logging command on the Setup menu. See ***Chapter 9—Data Logging*** *for instructions.*

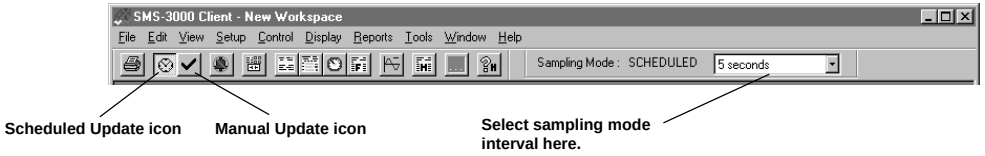
Setting the Sampling Mode (cont.)

- **Manual**. Stops SMS from automatically sampling data; to sample data, you must use the Take Sample command in the Control menu or click √ on the toolbar. SMS defaults to manual mode when it first goes online with a system.

Scheduled Update

A system must be placed online before you can change the sampling mode. To set a scheduled sampling mode and update interval, follow these steps:

1. On the Control menu, click Scheduled Update or click the Scheduled Update toolbar icon . The icon remains depressed, indicating that the system is in a scheduled sampling mode. The Sampling Mode at the top of the SMS main window changes from MANUAL (the default) to SCHEDULED:



2. Select the interval from the window:
   - Continuous (SMS samples as often as possible, beginning a new sample as soon as the previous one is complete)
   - 5 seconds
   - 10 seconds
   - 30 seconds
   - 1 minute

The scheduled update interval is set.

Manual Update

To set a manual sampling mode, click Manual Update on the Control menu. SMS takes a sample only when you click Take A Sample on the Control menu or when you click the Manual Update toolbar icon .

Where To Next?

After completing the procedures described in this chapter, you should have a basic understanding of how to set up a system and the devices included in it. You should also know how to go online and offline, and how to take data samples from system devices.

If your system includes Series 2000 Circuit Monitors, you need to read **Chapter 5—Advanced On-Board Setup for Series 2000 Circuit Monitors** after you have established online communications.

Refer to the table of contents or index for information on specific topics for which you need information.

Chapter 4—Displaying Real-Time Data

Real-time data is information that SMS displays as soon as possible after it is collected. The speed with which SMS can display data depends on such factors as how many devices are being polled and how many quantities are requested.

Use SMS to display information in a variety of real-time formats:

- tables
- bar charts
- meters
- active function list

To begin any display, click the desired display type on the Display menu (or click the corresponding toolbar). Follow the steps for the type of display you are creating; instructions for each type of display begin on the next page.

Data Update Rate

You control the rate at which SMS displays new real-time data. You can see updated data continuously or at scheduled intervals, or you can manually update, seeing only the sample of data that is taken at the time of update.

For more information on setting update intervals, see **Setting the Sampling Mode** in **Chapter 3—Basic System Setup and Operation**.

Displaying a Table

SMS lets you display real-time data for the devices that it identifies. The figure below lists the standard tables, and their characteristics:

Standard Table Types

Table Name	Devices Supported						
	CM2000	CM1	Power Meter	810D	Dig. Relay	PIF-3	PIF-85
Instantaneous Readings ①	X	X	X	X	X	X	
Load Current Summary ②	X	X	X	X	X	X	
810D Circuit Breaker Status ①				X			
810D Trip Unit Set-History ①				X			
Analog Input Readings ①	X						
Basic Reading Summary ②	X	X	X	X	X	X	
Demand Current Summary ②	X	X	X③	X	X		
Demand Readings ①	X	X	X③	X	X		
Digital Relay Settings-HIstory ①					X		
Energy Readings Summary ②	X	X	X	X			
Energy Readings ①	X	X	X	X			
Fundamental Phasor Readings ①	X		X				
MICROLOGIC C.B. Trip Unit Data ①						X	
Phase Unbalance Readings ①	X						
Power Factor Readings ①	X	X	X				
Power Factor Summary ②	X	X	X				
Power Flow Summary ②	X	X	X	X			
Power Quality Readings ①	X		X③				
Power Readings ①	X	X	X	X			
System Voltage Summary ②	X	X	X				
THD Current Summary ②	X		X③				
THD Voltage Summary ②	X		X③				
Transformer Readings ①							X
Transformer Summary ②							X

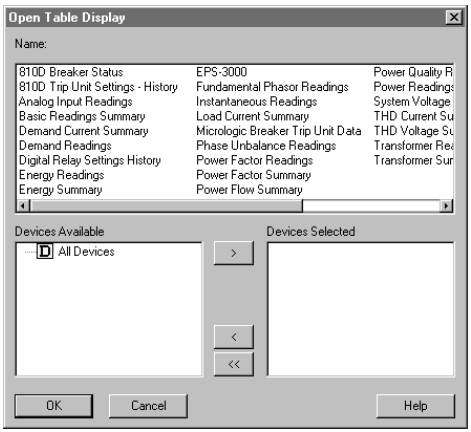
① Single device, multiple quantities
② Multiple devices, single quantity
③ Model PM-620 only

Displaying a Table (cont.)

You display a table, you must select the device(s) and quantities to include. When a table supports multiple devices, you can include individual devices or entire groups. When a table supports a single device only, you can include multiple devices, but the system displays data for only one device at a time.

To display a standard real-time table, follow these steps:

1. Click Tables… on the Display menu or click the toolbar icon  .
   The Open Table dialog box displays:



2. From the Tables Available box, click the standard table you want to display.

3. In the Devices Available box, select the device(s) or group(s) for which you want to display data; move them to the Devices Selected box.

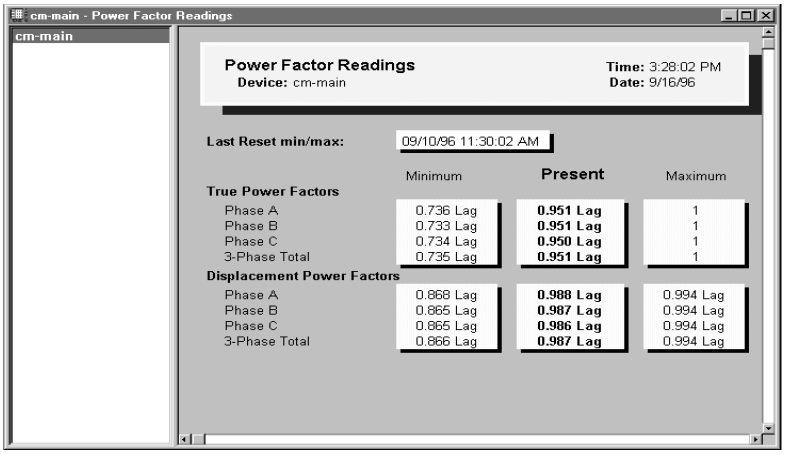
   Notes: *Always select the table before you select the device(s).*

   The table that you select will limit the devices for which you can display information. For example, if you select 810D Breaker Status, the Devices Available list will include only 810D circuit breakers that you have set up as devices in your system.

4. Click OK.

5. The table you requested displays.

A sample table, displaying power factor readings for a single device, is shown below. If you display a single-device table and select multiple quantities, click a device at the left of the table to see data for that device. If you select a multiple-device table, data for each device displays for comparison.



To change the update mode, click the Control menu and set the update to scheduled or manual. See instructions in **Setting the Sampling Mode** in **Chapter 3—Basic System Setup and Operation**.

Displaying a Bar Chart

SMS can display real-time data in the form of bar charts.

Although only one type of data can be viewed at a time (for example, load phase currents or power flows, but not both), you can change the displayed data with a single mouse click. You can display data from more than one device or group of devices. For example, you might want to view load phase currents for all three feeders in a group. The bar chart will contain three sets of three bars. Each set will correspond to phase A, phase B, and phase C of the feeders.

Displaying a Bar Chart (cont.)

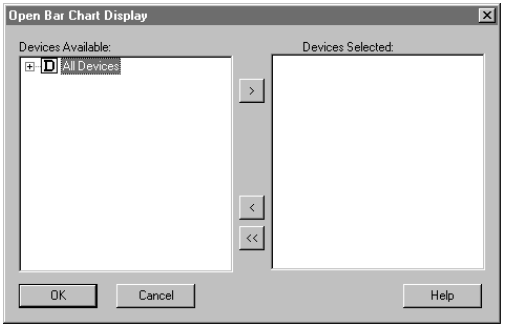
The following table lists, by device type, the real-time data that SMS can display.

Bar Chart Displays by Device

Data	CM 2000	CM 100/200	Power Meter	810D	PIF-3	Digital Relay	Powerlink	PIF-85
Load phase currents	X	X	X	X	X	X		
Average load current	X	X		X		X		
Demand phase currents	X	X	X	X		X		
Peak demand phase currents	X	X	X	X		X		
System phase voltages (L–L)	X	X	X					
System phase voltages (L–N)	X	X	X					
Power flows	X	X	X	X				
Demand power flows	X	X	X	X				
Phase power factors	X	X	X					
Power factor 3-phase total	X	X	X					

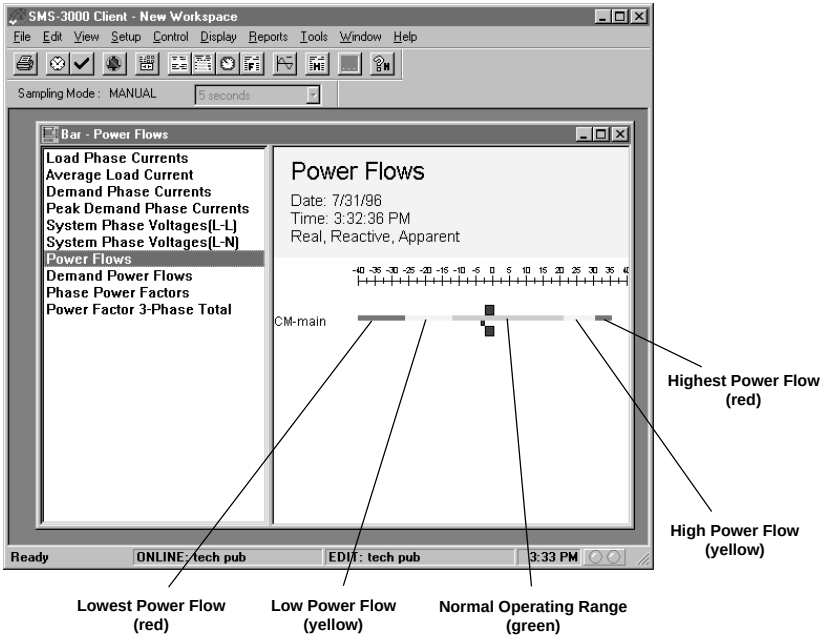
To display a bar chart, follow these steps:

1. On the Display menu, click Bar Charts… or click the toolbar icon  .
   SMS displays the Open Bar Chart Display dialog box:



2. In the Devices Available box, click the device(s) to be included, dragging each icon to the Devices Selected box.

3. Click OK to display the Bar Chart window.
   A sample window is illustrated below:



4. From the list on the left of the box, click the data type to display in the bar chart. The bar chart title changes to match the data type you select; the data displays in rows, one for each device you selected in step 2.

Operating Range Indication

SMS lets you define the normal, low, and high operating ranges for devices. When the ranges are established, the bar charts will display color tracking to indicate the limits of each range for that device. This indication makes it easy for operators to quickly assess the status of the devices being metered.

The normal operating range displays as a green bar. The yellow bar indicates conditions that are low or high, outside of the normal range. The red bar indicates the lowest or highest conditions that are even farther outside of the normal range. If only two setpoints (high and low) are established, there will be no yellow bar, only green and red. The figure above illustrates color tracking indication of operating ranges.

Operating Range Indication (cont.)

To establish operating range indication for a device, you must:

- add an analog function that you want to monitor (such as voltage A-N or Current B)
- choose the device at which you want to monitor the function
- establish setpoints, with pickup and dropout points, to define the limits of each range. You must establish at least two setpoints for a function; for example, you might set high alarm and low alarm, with pickup and dropout points to establish the range.

  The pickup values determine when green changes to yellow and yellow changes to red.

Displaying a Meter

You can display real-time data on analog meters. Although you can view data for only one device at a time, you can select multiple devices and toggle between them to display the data.

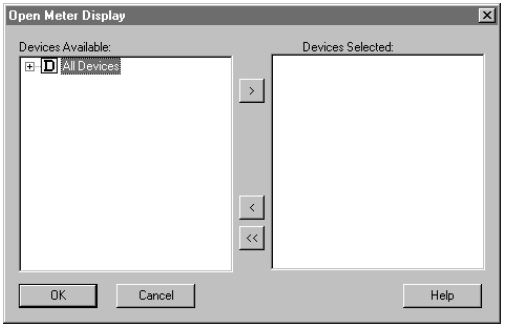
The four-meter panel includes the following data:

- voltage (each phase, line-line and line-neutral)
- amperage (each phase and 3-phase)
- kilowatts (real, reactive, and apparent)
- power factor (each phase and 3-phase)

To display a meter, follow these steps:

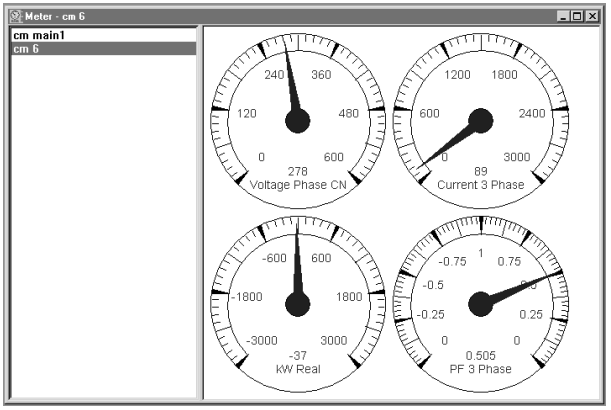
1. On the Display menu, click Meters…. or click the toolbar icon  .

   SMS displays the Open Meter Display dialog box:



2. In the Devices Available box, click the device(s) for which you want to see meter data. Drag the devices or click > to move the devices to the Devices Selected box.

3. Click OK to display the Meter window:



4. To display meter data for a device, click the desired device in the list at the left of the window. Meter data displays in the large window on the right. The current reading for the quantity being logged displays just above the quantity title (located at the bottom of each meter).

5. To view different phase quantities, double-click the quantity title. For example, on the voltage meter (upper left), double-click the Voltage Phase AN title, to change between AN, BN, CN, AB, BC, and CA.

Note: *Meter data displays (needles display within the meters) only if the sample that you request is valid. No needles will display if:*

- *the wire configuration is not supported; for example, no line-neutral voltages display for a 3-wire device*
- *there is a sampling error*

The meters update according to the sampling mode (selected on the Control menu; see **Setting the Sampling Mode** in **Chapter 3—Basic System Setup and Operation**). For example, in scheduled update mode, at 10-second intervals, the meters display new readings about every ten seconds.

Operating Range Indication

SMS lets you define the normal, low, and high operating ranges for devices. When the ranges are established, the meters will display color tracking to indicate the limits of each range for that device. This indication makes it easy for operators to quickly assess the status of the devices being metered.

The normal operating range displays as a green bar along the meter edge. The yellow bar indicates conditions that are low or high, outside of the normal range. The red bar indicates the lowest or highest conditions that are even farther outside of the normal range. If only two setpoints (high and low) are established, there will be no yellow bar, only green and red.

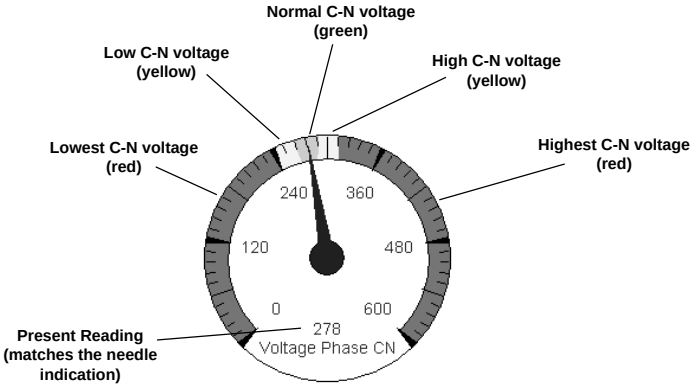
To establish operating range indication for a device, you must:

- add an analog function that you want to monitor (such as voltage A-N or Current B)
- choose the device at which you want to monitor the function
- establish setpoints, with pickup and dropout points, to define the limits of each range. You must establish at least two setpoints for a function; for example, you might set high alarm and low alarm, with pickup and dropout points to establish the range.

  The pickup values determine when green changes to yellow and yellow changes to red.

For instructions, see **Creating Global Functions** in **Chapter 6—Setting Up Functions and Alarms**. The following figure illustrates a C-N voltage meter, indicating the normal, high, and low ranges established for that function.

Note: *If you establish only two setpoints (high and low), you will not see the yellow bar, just green for normal and red for both low and high.*

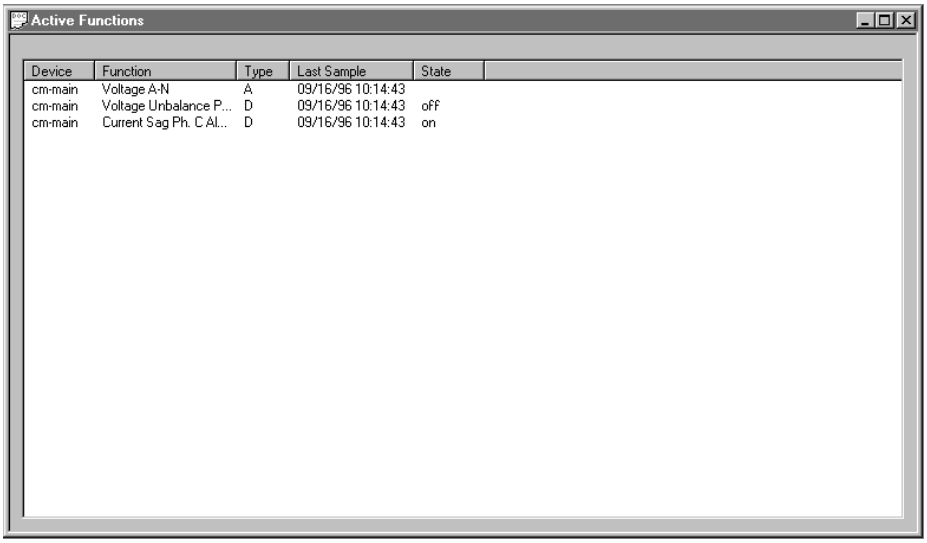


Displaying a List of Active Functions

You can display a list of all active functions in a system. Active functions are analog or digital functions that are set up with some level of alarm assigned to them. To view this list, follow these steps:

1. From the Display menu, click Function Tables… or click the toolbar icon  .

   SMS displays the list:



The table columns are:

Device:	the device name
Function:	the function name
Type:	A = analog, D = digital
Last Sample:	the date/time stamp for when this sample was taken
State:	for digital functions, the name given to the Equal or Non-Equal condition

Chapter 5—Advanced On-Board Setup for Series 2000 Circuit Monitors

This chapter applies only to the Series 2000 Circuit Monitors (CM-2050 and higher). Before you follow the instructions in this chapter, be sure that you are familiar with the capabilities of the circuit monitors in your system. You may need to refer to the section "Circuit Monitor Models Feature Comparison" in Chapter 3–Basic System Setup and Operation.

The Series 2000 Circuit Monitor setup process consists of four parts:

- Basic setup—Set up basic parameters such as PT and CT ratios, demand interval, demand type, and system type. Basic setup for circuit monitors is described in "Chapter 3—Basic System Setup and Operation." The other three setup tasks are described in this chapter.
- Input/output module setup—Set up relay outputs, analog inputs and analog outputs. (The circuit monitor must be equipped with an optional input/output module.)
- On-board data storage setup—Set up circuit monitor event log, waveform capture logs, and data logs.
- On-board alarms/events setup—Set up the circuit monitor's on-board alarms, and configure it to perform actions, such as operating a relay, when an alarm occurs.

The setup tasks are on four tabs in the Device Setup dialog box for a Series 2000 Circuit Monitor.

To access the Device Setup dialog box for a Series 2000 Circuit Monitor, do the following:

1. On the Setup menu, click Devices/Routing...

   SMS displays the Device Setup dialog box.

2. In the Devices box, click the Series 2000 Circuit Monitor to set up, then click Configure, or double-click on a device.

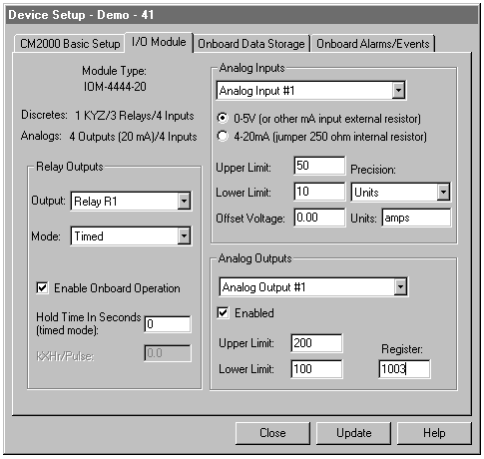
   SMS displays the Device Setup dialog box for a Series 2000 Circuit Monitor. The rest of this chapter tells how to use the I/O Module, On-Board Data Storage, and On-Board Alarms/Events tabs.

Setting Up Input/Output Modules

Use the I/O Module tab (shown below) in the Series 2000 Circuit Monitor Device Setup dialog box to set up circuit monitor inputs and outputs. SMS must be online with your system to perform I/O Module setup.

If you are not already viewing the I/O Module tab, follow these steps to display the tab:

1. On the File menu, click Online, and go online with the desired system. Click Manual Update on the Control menu to ensure that SMS is not sampling data.
2. On the Setup menu, click Devices/Routing...
   SMS displays the Device Setup dialog box.
3. In the Devices box, click a Series 2000 Circuit Monitor that is equipped with an I/O module, then click the Configure button.
4. Click the I/O Module tab.

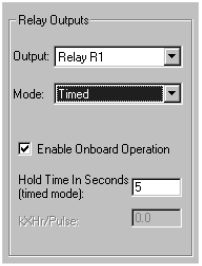


The upper left-hand corner of the tab shows the type of I/O module installed on the circuit monitor. It also lists the inputs and outputs that the module provides.

The rest of the tab is divided into three boxed areas used to configure relay outputs, analog inputs, and analog outputs. These are described in the following sections.

Setting Up Relay Outputs

Each relay can be configured independently. For each relay, you can determine the mode of operation, and whether the relay will be controlled automatically by circuit monitor on-board functions, or externally (remotely) by a programmable logic controller or application software such as SMS.



To set up a relay output, follow these steps:

1. In the Output box, select a relay to configure.

The Pulse Initiator is the KYZ solid-state Form C relay output, which is rated for billions of operations at 96 milliamps (suitable for pulse initiator applications). Relays R1, R2, and R3 are Form C mechanical relays rated for tens of thousands of operations at 10 amps/120 Vac (suitable for many control applications, such as switchgear).

2. In the Mode box, select the desired operating mode for the relay you chose in step 1. Refer to the Circuit Monitor Relay Operation Modes table on the next page for a description of the 10 modes.

   Note that the first three modes—Normal, Latched, and Timed—function differently when the relay is *externally controlled* than when it is *on-board* (or internally) *controlled*. The table points out the differences. All pulse initiation modes, modes 4–10, are on-board controlled.

3. If you want the relay to be controlled automatically by the circuit monitor in response to one or more of the circuit monitor's on-board alarm conditions—such as "Over KW Demand" or "Status input S3 transition from OFF to ON"—check the Enable On-Board Operation box. The circuit monitor will check for alarm conditions and operate relays even when your computer is turned off. ***Note****: When you receive a new Series 2000 Circuit Monitor and install an I/O module on it, the default for all relays is* ***Not Enabled*** *for on-board operation. Also, on-board operation is supported only by circuit monitor models CM-2150 or higher.*

4. If the relay will be controlled by a device external to the circuit monitor—such as a SY/MAX programmable controller or from a computer using SMS's control outputs feature—*do not* check the Enable On-Board Operation box.

   Note: *Before automatic operation can occur, you must enable the desired on-board alarm conditions, and specify the relays to be automatically operated when each alarm occurs. The section "Setting Up On-Board Alarms" in this chapter tells how. "Chapter 13—Control Outputs" has more details on the implications of enabling a relay for on-board operation and how you can use SMS to override on-board relay operation.*

5. If, in step 2, you selected "Timed" mode, enter the desired number of seconds (1 to 32,767) for the relay to stay energized.

6. If, in step 2, you selected any of the pulse initiation modes (modes 4 through 10), enter the pulse value from 0.0 to 3,276.7.

   For example, if the relay mode is "Absolute KWH Pulse" and you determine that each relay change of state is to signify that an additional 0.5 kilowatthours have been consumed by the circuit being monitored, enter 0.5 in this box. See "Calculating the Watthour-Per-Pulse Value" in the Series 2000 Circuit Monitor instruction bulletin for instructions on calculating the KxHR/Pulse value for your application.

Circuit Monitor Relay Operation Modes

1. Normal.

Externally Controlled. The user must energize the relay by issuing a command from a remote PC or programmable logic controller. The relay remains energized until a command to de-energize is issued from a remote PC or programmable logic controller, or until the circuit monitor loses control power.

On-Board Controlled. When an alarm condition assigned to the relay occurs, the relay is energized. The relay is not de-energized until *all* alarm conditions assigned to the relay have dropped out, or until the circuit monitor loses control power.

---

2. Latched.

Externally Controlled. The user must energize the relay by issuing a command from a remote PC or programmable logic controller. The relay remains energized until a command to de-energize is issued from a remote PC, programmable logic controller, the front panel of the circuit monitor, or until the circuit monitor loses control power.

On-Board Controlled. When an alarm condition assigned to the relay occurs, the relay is energized. The relay remains energized—even after all alarm conditions assigned to the relay have dropped out— until the Priority 1 Log is cleared from the front panel of the circuit monitor, or until the circuit monitor loses control power. See “Clearing the Priority 1 Log” in Chapter 4 of the **Series 2000 Circuit Monitor** instruction bulletin.

---

3. Timed.

Externally Controlled. The user must energize the relay by issuing a command from a remote PC or programmable logic controller. The relay remains energized until the timer expires, or until the circuit monitor loses control power. If a new command to energize the relay is issued before the timer expires, the timer restarts.

On-Board Controlled. When an alarm condition assigned to the relay occurs, the relay is energized. The relay remains energized until the timer expires, or until the circuit monitor loses control power. If the alarm condition is still true when the timer expires, the circuit monitor reestablishes the relay, causing the relay to cycle off and on during a prolonged alarm period.

---

4. Absolute kWH Pulse.

This mode assigns the relay to operate as a pulse initiator with a user-defined number of kWH per pulse. In this mode, both forward and reverse energy are treated as additive (as in a tie breaker). This is the mode that the KYZ relay assumes when watthours-per-pulse is set up from the front panel of the circuit monitor. The KYZ Pulse Initiator relay output was designed for pulse applications such as this.

---

5. Absolute kVARH Pulse.

This mode assigns the relay to operate as a pulse initiator with a user-defined number of kVARH per pulse. In this mode, both forward and reverse energy are treated as additive (as in a tie breaker). The KYZ Pulse Initiator relay output was designed for pulse applications such as this.

---

6. kVAH Pulse.

This mode assigns the relay to operate as a pulse initiator with a user-defined number of kVAH per pulse. Since kVA has no sign, there is only one mode for kVAH pulse. The KYZ Pulse Initiator relay output was designed for pulse applications such as this.

7. kWH In Pulse.

This mode assigns the relay to operate as a pulse initiator with a user-defined number of kWH per pulse. In this mode, only the kWH flowing *into* the load is considered. The KYZ Pulse Initiator relay output was designed for pulse applications such as this.

8. kVARH In Pulse.

This mode assigns the relay to operate as a pulse initiator with a user-defined number of kVARH per pulse. In this mode, only the kVARH flowing *into* the load is considered. The KYZ Pulse Initiator relay output was designed for pulse applications such as this.

9. kWH Out Pulse.

This mode assigns the relay to operate as a pulse initiator with a user-defined number of kWH per pulse. In this mode, only the kWH flowing *out of* the load is considered. The KYZ Pulse Initiator relay output was designed for pulse applications such as this.

10. kVARH Out Pulse.

This mode assigns the relay to operate as a pulse initiator with a user-defined number of kVARH per pulse. In this mode, only the kVARH flowing *out of* the load is considered. The KYZ Pulse Initiator relay output was designed for pulse applications such as this.

Setting Up Analog Inputs

You'll configure analog inputs in the Analog Inputs box on the I/O Module tab. If the I/O module you are configuring does not have any analog inputs, the fields in this box will be greyed out.

Important: *Any change to either analog inputs or analog outputs will cause the circuit monitor to restart. Be aware that any energized relay outputs will de-energize as the circuit monitor restarts.*

To set up an analog input, follow these steps:

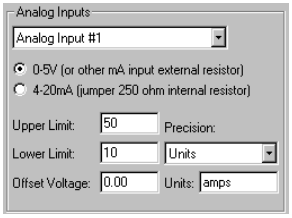
1. In the Analog Inputs box, select the analog input to configure, from the drop-down list box.

2. Select either the 0–5V or 4–20mA radio button. The button you select depends on how the selected analog input is wired. (Refer to the Series 2000 Circuit Monitor instruction bulletin for wiring instructions.)

   • *0–5V (or other mA external resistor).* By default, the circuit monitor's analog inputs accept 0–5 volts dc. The phrase "or other mA external resistor" means that you could apply, for example, a 0–1 mA signal through 5000 ohms of resistance to obtain 0–5 volts.

   • *4–20 mA (jumper 250 ohm internal resistor).* The 4–20 mA option passes the input current through a 250 ohm internal resistor resulting in a 1–5 volt dc signal measurement. A user-installed jumper wire is required on the rear of the I/O Module.

3. Enter values in the remaining fields as described in the Analog Inputs table, below.



Analog Inputs Table

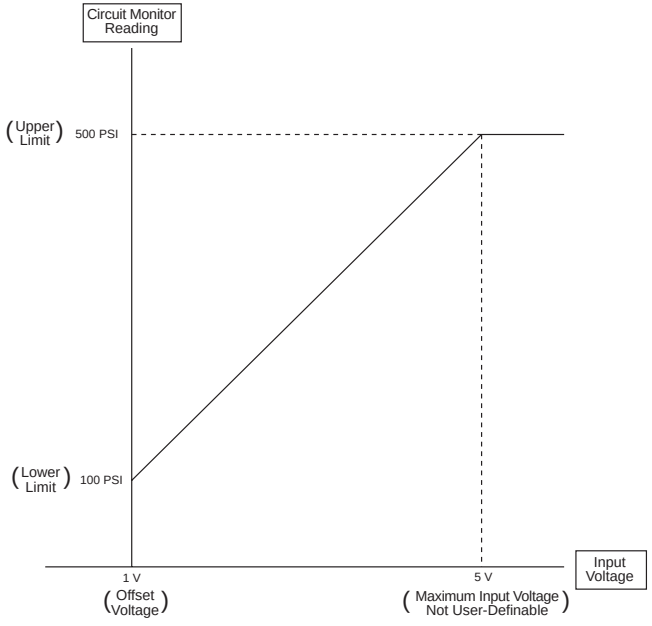
At this field…	Do this…
Upper Limit	Enter the value you want SMS to report when the input voltage is equal to or greater than 5 volts (the maximum input voltage).
Lower Limit	Enter the value you want SMS to report when the input voltage is equal to the offset voltage, defined below.
Offset Voltage	Enter the lowest input voltage (in hundredths of a volt) that represents a valid reading. When the input voltage falls below this value, SMS reports “N/A.”
Precision	Select the desired precision—units, tenths, hundredths, or thousandths—from the drop down list box.
Units	Enter up to six characters that describe the units of the monitored analog value (for example, PSI or Deg. C).

Analog Input Example

The figure below shows an analog input example. In this example, the analog input has been configured as follows:

Input Type	0–5V
Upper Limit	500
Lower Limit	100
Offset Voltage	1 Volt
Precision	Units
Units	PSI

The figure below shows the analog input configured as described above.



The table below shows circuit monitor readings at various input voltages.

Input Voltage	Analog Inputs 2000 Table Reading
0.5 V	N/A (below offset voltage)
1 V	100 PSI
2 V	200 PSI
2.5 V	250 PSI
5 V	500 PSI
5.5 V	500 PSI (above max input voltage)

Setting Up Analog Outputs

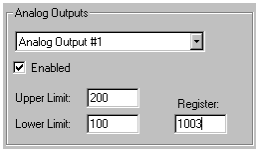
You will configure analog outputs in the Analog Outputs box on the I/O Module tab. The outputs are either 0–1 mA or 4–20 mA depending on the I/O Module type. SMS shows the output type in the upper left corner of the I/O module tab. If the I/O module you are configuring does not have analog outputs, the fields in this box will be greyed out.

Important: *Any change to either analog inputs or analog outputs will cause the circuit monitor to restart. Be aware that any energized relay outputs will de-energize as the circuit monitor restarts.*

The procedure below tells how to set up analog outputs. An analog output example follows.

To set up an analog output, follow these steps:

1. In the Analog Outputs box, select the analog output to configure, from the drop-down list box.
2. Check the Enabled checkbox to enable the selected analog output.
3. Enter values in the remaining fields as described in the Analog Outputs table, below.



Analog Outputs Table

At this field…	Do this…
Upper Limit	Enter the register value that is equivalent to the maximum output current (1 mA or 20 mA).
Lower Limit	Enter the register value that is equivalent to the minimum output current (0 mA or 4 mA).
Register	Enter the number of the register for which you are creating an analog output. For example, enter 1001 for Frequency. See the circuit monitor instruction bulletin for a register listing.

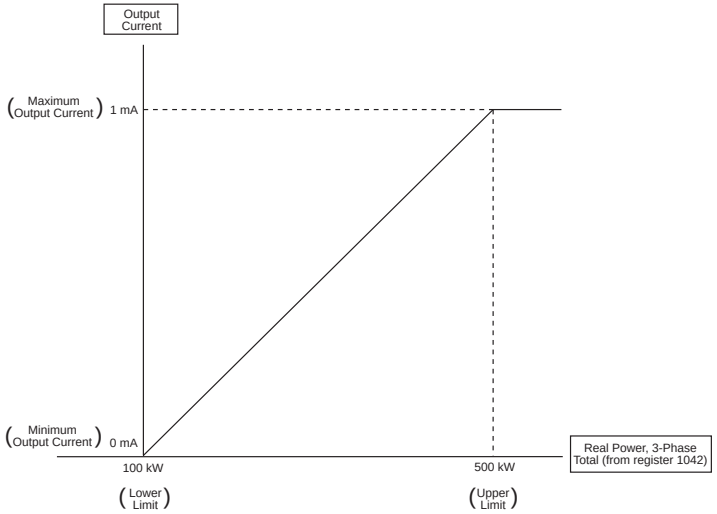
Analog Output Examples

The figure below illustrates the relationship between the output range and the upper and lower limit. In this example, the analog output has been set up as follows:

Output Range①	0–1 mA or 4–20 mA
Register Number	1042 (Real Power, 3-phase total)
Lower Limit	100 kW
Upper Limit	500 kW

① The Output range depends on the type of I/O module installed.

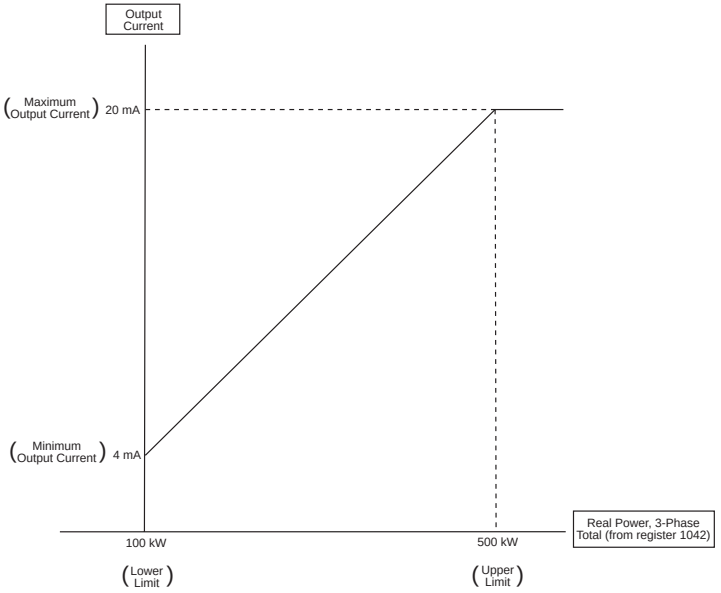
The figure below shows the relationship between the output range and the upper and lower limit for a 0–1 mA I/O Module.



The table below shows the output current at various register readings for a 0–1 mA I/O Module.

Register Reading	Output Current
50 kW	0 mA (below lower limit)
100 kW	0 mA
200 kW	0.25 mA
300 kW	0.5 mA
500 kW	1 mA
550 kW	1 mA (above upper limit)

The figure below shows the relationship between the output range and the upper and lower limit for a 4–20 mA I/O Module.



The table below shows the output current at various register readings for a 4–20 mA I/O Module.

Register Reading	Output Current
50 kW	4 mA (below lower limit)
100 kW	4 mA
200 kW	8 mA
300 kW	12 mA
500 kW	20 mA
550 kW	20 mA (above upper limit)

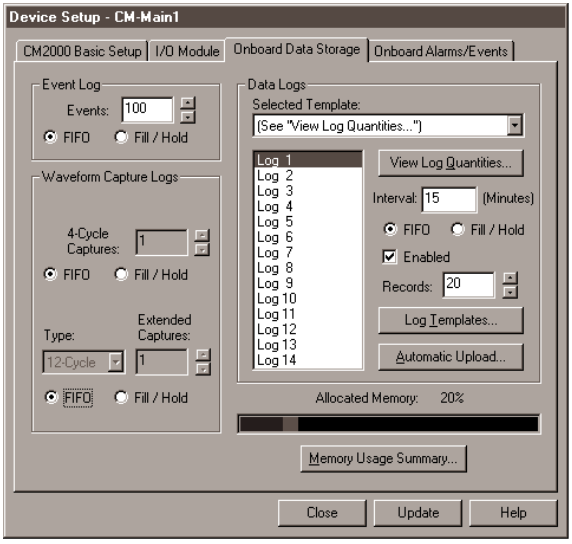
Setting Up On-Board Data Storage

You'll use the On-Board Data Storage tab (shown below) in the Series 2000 Circuit Monitor Device Setup dialog box to set up circuit monitor on-board memory including the circuit monitor's event log, waveform capture logs, and data logs. (Only circuit monitor models CM-2150 and higher are equipped with on-board storage.)

Note: *SMS must be online to your system to set up On-Board Data Storage. If SMS is not online, the On-Board Data Storage tab is grayed out. Also, we recommend that you put SMS in manual update mode while you set up on-board data storage.*

If you are not already viewing the On-Board Data Storage tab, follow these steps to display the tab:

1. On the Setup menu, click Devices/Routing...
   SMS displays the Device Setup dialog box.
2. In the Devices box, click a Series 2000 Circuit Monitor (model CM-2150 or higher), then click the Configure button.
3. Click the On-Board Data Storage tab.



Circuit Monitor Storage Considerations

The amount of memory available for storing events, waveform captures, and historical data on-board the circuit monitor depends on the circuit monitor model. When you set up a circuit monitor's on-board storage, you must allocate the available memory among

the event log, waveform capture logs, and data logs. SMS has two tools that can help as you set up the circuit monitor's on-board storage:

- Allocated Memory Color Bar Indicator
- Memory Usage Summary

As you enter values in the On-board Data Storage dialog box, the Allocated Memory Color Bar Indicator changes to show the percentage of the circuit monitor's memory that has been allocated.

The colors in the bar show how the allocated memory is divided among the different log file types (event, waveform, and data logs) and the portion of the circuit monitor memory still available.

Bar Color	Indicates the allocated device memory…
blue	Used by the event log
red	Used by the data logs
green	Used by the waveform capture logs
black	Still available

To display the Memory Usage Summary, click the Memory Usage Summary button at the bottom of the On-board Data Storage tab. The Memory Usage Summary dialog box contains two tabs:

- Calculated—The Calculated tab shows how the memory allocation choices you've made on the Onboard Data Storage tab will affect memory usage if you choose to update the circuit monitor. SMS does not send the memory allocation information to the circuit monitor until you either click Update, or click Close and save the changes. You can use the Calculated tab to try different memory allocation scenarios before you update the circuit monitor.
- Actual—The Actual tab shows how the circuit monitor's memory is presently allocated.

The Calculated and Actual tabs display the following information:

- Status of each file
- Number of records allocated to each file
- Number of registers used by the allocated records
- Percentage of the circuit monitor's total available memory that is used by each log file
- Percentage of the circuit monitor's total available memory that is used by all log files

Setting Up the Circuit Monitor On-Board Event Log

Each Series 2000 Circuit Monitor (model CM-2150 and higher) has an on-board event log to record the occurrence of important events. The circuit monitor can be configured to log the occurrence of any on-board alarm condition as an event. The section "Setting Up On-Board Alarms/Events" later in this chapter tells how to set up the circuit monitor to log the occurrence of on-board alarm conditions in the event log.

You'll set up the circuit monitor's on-board event log in the Event Log box in the Series 2000 Circuit Monitor On-Board Data Storage dialog box. The number of events the circuit monitor can store depends on how you allocate the available memory among the event log, waveform capture logs, and data logs. Refer to the Allocated Memory Color Bar indicator and the Memory Usage Summary to ensure that you don't exceed the available memory.

To set up the event log, follow these steps:

1. In the Events box, enter the maximum number of events that the event log will store.

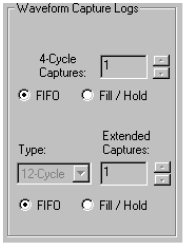
2. Select either the FIFO (recommended) or Fill/Hold radio button to specify the way the event log file will store information.

   The FIFO (First-In-First-Out) mode stores information continuously and overwrites the oldest data with the newest data after the maximum has been reached. The Fill/Hold mode stores new events until the event log file reaches the maximum number of events; it then stops storing new events until you clear the event log using the Resets command on the Control menu.

Setting Up the Circuit Monitor On-Board Waveform Capture Logs

The model CM-2250 circuit monitor stores one 4-cycle and one 12-cycle waveform capture in volatile memory. (Volatile memory means that the waveforms are lost when the circuit monitor loses control power.) Circuit monitor models CM-2350 and higher can store multiple waveform captures (from 4 to 60 cycles in length) in non-volatile memory.

You'll set up the circuit monitor's on-board waveform capture logs in the Waveform Capture Logs box in the Series 2000 Circuit Monitor On-Board Data Storage dialog box. Keep in mind that the number of waveforms the circuit monitor can store depends on how you allocate the available memory among the event log, waveform capture logs, and data logs. Refer to the Allocated Memory Color Bar indicator and the Memory Usage Summary to ensure that you don't exceed the available memory.



To set up the Waveform Capture Logs, follow these steps:

1. In the 4-Cycle Captures box, enter the maximum number of 4-cycle waveforms to store. Then click either the FIFO or Fill/Hold radio button.

   If you select FIFO, the circuit monitor logs 4-cycle waveforms until it reaches the maximum number of 4-cycle waveforms; then, each time it logs a new 4-cycle waveform, it discards the oldest 4-cycle waveform and logs the new. If you select Fill/Hold, the circuit monitor logs 4-cycle waveforms until it reaches the maximum; it stops storing new 4-cycle waveforms until you clear the log using the Resets command on the Control menu.

2. In the Type box, select the type of extended waveform capture to log—12-, 24-, 36-, 48-, or 60-cycle. Select the number of extended captures. Then click FIFO or Fill/Hold.

Setting Up the Circuit Monitor On-Board Data Logs

Circuit monitor models CM-2150 and higher can store historical data in on-board data log files. You can set up the circuit monitor to log data at a user-defined interval. In addition, you can set up the circuit monitor to automatically force entries into the data logs when alarm conditions occur; the section “Setting Up On-Board Alarms/Events” later in this chapter tells how.

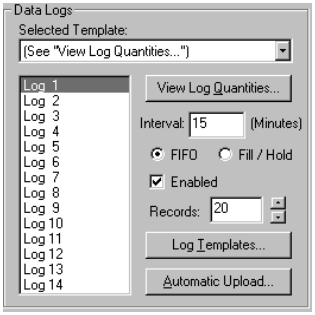
You’ll set up the circuit monitor’s on-board data logs in the Data Logs box in the Series 2000 Circuit Monitor On-Board Data Storage dialog box. Keep in mind that the amount of data the circuit monitor can store depends on how you allocate the available memory among the event log, waveform capture logs, and data logs. Refer to the Allocated Memory Color Bar indicator and the Memory Usage Summary to ensure that you don’t exceed the available memory.

The circuit monitor supports up to 14 data log files. You can use several data log files to help you organize logged data. For example, you could log current and voltage values in Log 1, power and energy values in Log 2 , and power quality values in Log 3. (See “Organizing Data Log Files” following this section for more tips.)

For each circuit monitor, you must assign a log template to each data log you set up. A log template defines the quantities to be logged, start and end dates and times, and log interval. You can choose from the available predefined templates, or define your own.

Click the Log Templates button to display the dialog box used to define log templates. This is the same dialog box you'll use to define log templates for devices that do not have on-board logging capabilities, such as series 100/200 circuit monitors. "Chapter 9—Data Logging" offers detailed instructions on how to create log templates.

SMS can automatically retrieve the data from circuit monitors' on-board data log files and store it in the SMS database on your computer's hard disk. To allow SMS to do this, you must create an Onboard Data Log Upload task *for each circuit monitor* and schedule it to upload data at the desired interval. The Onboard Data Log Upload task combines the data logged by the circuit monitor with the data logged by SMS so that you can view the data in history tables and as time trend plots. For devices that do not have on-board logging capabilities, such as series 100/200 circuit monitors, you will need to set up SMS to log data directly to the SMS database. See "Chapter 9—Data Logging" for instructions on how to set up data logging for devices that do not have on-board logging capabilities. See "Chapter 7—Using Tasks to Automate Processes" for instructions on how to create and schedule an Onboard Data Log Upload task.



To set up a data log, follow these steps:

1. In the list of data logs (Log 1–Log 14), click a data log to set up.

2. In the Selected Template box, click a log template to assign to the data log, or if you want to define a new log template, click the Log Templates button. (See "Creating Log Templates" in Chapter 9 for instructions on defining log templates.)

3. If you want to define a task that automatically retrieves data from the circuit monitor's on-board data log files and combines it with the SMS database, click the Automatic Upload button. See "Chapter 7—Using Tasks to Automate Processes" for instructions on creating and scheduling an Onboard Data Log Upload task.

4. In the Log Interval box, enter the number of minutes, from 0–1440, between log entries.

5. Click either the FIFO (recommended) or Fill/Hold radio button.

   If you select FIFO, the circuit monitor logs data until it reaches the maximum number of records; then, each time it logs a new record, it discards the oldest record and logs the new. If you select Fill/Hold, the circuit monitor logs data until it reaches the

maximum; it then stops logging new data until you clear the data log using the Resets command on the Control menu.

6. Check the Enabled checkbox to enable the selected data log.

   When the Enabled box is checked, the circuit monitor begins logging data at the date and time specified in the log template. The circuit monitor will not log data to the selected data log unless the Enabled box is checked. Note: The date and time are

7. In the Records box, enter the maximum number of records (from 1 to 472) to be stored in the selected data log.

   A record is one set of the quantities that are specified in the log template. For example, assume a log template is set up to begin logging current and voltage values hourly, beginning at 8:00 AM the following day. At 8:00 AM, the circuit monitor logs the current and voltage values—record 1. At 9:00 AM, the circuit monitor logs the second set of current and voltage values—record 2. The circuit monitor continues logging records of data at the specified interval until it reaches the maximum number of records that you specify. When it reaches the maximum, it either stops logging new data (if you selected Fill/Hold in step 4) or continues logging by discarding the oldest record and storing the newest (if you selected FIFO).

Organizing Data Log Files

There are many ways to organize data log files. One possible way is to organize log files according to the logging interval. You might also define a log file for entries forced by alarm conditions. For example, you could set up four data log files as follows:

Data Log 1: Voltage logged every minute. File is large enough to hold 60 entries so you can look back over the last hour's voltage readings.

Data Log 2: Voltage, current, and power logged hourly for a historical record over a longer period.

Data Log 3: Energy logged once daily. File is large enough to hold 31 entries so you can look back over the last month and see daily energy use (kilowatt hours, for example).

Data Log 4: Report by exception file. File contains data log entries that are forced by the occurrence of an alarm condition. Set the log interval in the log template to zero for this purpose.

The Default Logging Template

Series 2000 circuit monitors that have on-board logging memory are shipped with data log 1 pre-configured and enabled to log basic metered values. SMS is shipped with a default logging template named *Basic Values* that matches the circuit monitor's default data log 1 configuration. Therefore, in order to import basic values from circuit monitors into SMS, you need only define an auto upload task to get data log 1 from the circuit monitors. See "Creating a New CM2000 Onboard Data Log/Waveform Upload Task" in Chapter 7 for instructions on defining a task to automatically retrieve on-board data logs.

Setting Up On-Board Alarms/Events

Series 2000 circuit monitors (models CM-2150 and higher) can detect over 100 alarm conditions, including over/under conditions and status input changes. The circuit monitor can perform actions in response to these alarm conditions. The available actions are:

- Force data log entries in up to 14 circuit monitor data log files
- Operate one or more mechanical relays
- Perform a 4-cycle waveform capture (CM-2250 and higher)
- Perform an extended (12-, 24-, 36-, 48-, or 60-cycle) waveform capture (CM-2250 and higher)

The Onboard Alarms/Events tab of the Series 2000 Circuit Monitor device setup dialog box is used to set up the circuit monitor's onboard alarms. On this tab you'll enable the desired alarm conditions, assign a priority level to each, define pickup and dropout setpoints, and assign actions to be executed when the alarm condition occurs.

***Notes**:*
- *SMS must be online to your system to perform Onboard Alarm/Event setup. If SMS is not online, the Onboard Alarms/Events tab is grayed out.*
- *By default, SMS checks for onboard alarms at 60 second intervals. You can change the Onboard Alarm Check interval using the SMS configuration program, called Smscfg. For instructions on using Smscfg to change the Onboard Alarm Check Interval, see "Changing the Onboard Alarm Check Interval" at the end of this chapter.*

***Important:** When you make any changes to the circuit monitor's on-board alarms, the circuit monitor restarts when you exit online setup. Be aware that any energized relay outputs will de-energize as the circuit monitor restarts.*

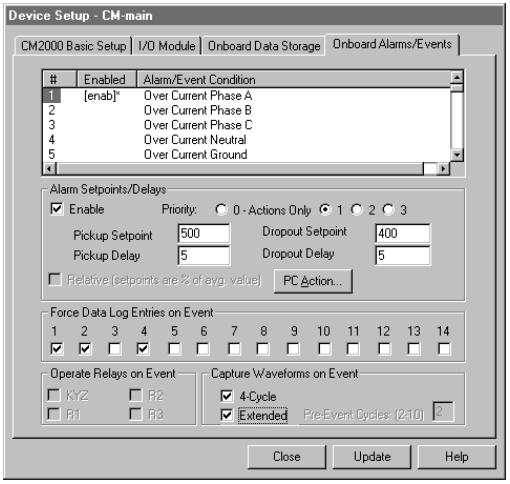
If you are not already viewing the Onboard Alarm/Events tab, follow these steps to display the tab:

1. On the Setup menu, click Devices/Routing...
   SMS displays the Device Setup dialog box.
2. In the Devices box, select a Series 2000 Circuit Monitor (model CM-2150 or higher), then click the Configure button.
3. Click the Onboard Alarms/Events tab.

To set up an alarm condition, follow these steps:

1. In the Alarm/Event Condition box, click the number of the alarm condition to set up.
   SMS updates the dialog box to show the current settings for the selected alarm condition.

2. Enter information on the Onboard Alarms/Events tab as described in the Onboard Alarm Events Tab table on the next page.



Onboard Alarms/Events Tab

At this field…	Do this…
Enable	Check this box to enable the selected alarm condition, or uncheck this box to disable the alarm condition. When the Enable check box is first checked, the prefix "[enab]" and an asterisk (*) appear in the Enabled column next to the selected alarm condition. When you disable a previously enabled alarm condition, the [enab] prefix disappears, but the asterisk stays to indicate that changes were made to the alarm condition during the setup session.
Priority	Click a radio button to Select a priority (0, 1, 2, or 3) for the selected alarm condition. The priority levels 1, 2, 3, and 0 correspond to High, Medium, Low, and Action Only. Refer to the table below for a description of the operator notification provided by each priority level. **Note:** Any priority level (including Priority 0) can trigger waveform captures, force data log entries, and operate relay outputs. Priority level selection affects only the methods by which the operator is informed that an alarm condition has occurred.

	SMS Software Alarm Operation	**SMS** Software Event Log Entry	**Circuit Monitor** Front Panel Alarm LED Operation	**Circuit Monitor** On-Board Event Log Entry
Priority 1	Level 1	Yes	LED flashes upon occurrence of event, continues to flash after event condition clears until operator clears the P1 Log from the front panel of the circuit monitor	Yes
Priority 2	Level 2	Yes	LED flashes upon occurrence of event, stops flashing when event condition clears	Yes
Priority 3	Level 3	Yes	Same as Priority 2	Yes
Priority 0	No Alarm	No	No operation	No

Pickup & Dropout Setpoints/Delays

For each alarm/condition that you set up, you must specify pickup and dropout setpoints and delays. An analog alarm becomes active when the metered value exceeds the setpoint for the specified pickup delay. The alarm becomes inactive when the metered value falls below the dropout setpoint for the specified dropout delay. See Appendix C
for a guide to entering pickup and dropout setpoints and delays.

***Note**: When defining pickup and dropout setpoints for high-speed alarms (alarm numbers 200–214), be sure to define a reasonable hysteresis between the pickup and dropout setpoints. If a reasonable hysteresis is not used, alarms might occur continually. When the circuit monitor detects that this is happening, it may suspend the operation of all high-speed alarms. If you suspect that the high-speed alarms have been*

disabled, use SMS's register read/write feature to read register 2038. If register 2038 contains a nonzero value, high-speed alarms have been disabled. To re-enable high-speed alarms, write a zero to register 2038, then go to the Onboard Alarms/Events tab in the Device Setup dialog box and check the Enable checkbox for each high-speed alarm that was disabled. To prevent them from being disabled in the future, change the pickup and dropout setpoints on the high-speed alarms to include additional hysteresis.

Relative

For tracking high-speed events (numbered 201–214) that are available for the CM-2350 or higher, you can check the Relative box to provide an alarm. Each time the average value is exceeded by the pickup percentage, an alarm occurs. The delay entered is in cycles. The percent relative average is calculated over a five-metering-cycle interval. This checkbox is only available for alarm conditions 201–214. For all other alarm conditions it is grayed out.

PC Action…

Click this button to assign a task that automatically executes when the selected alarm condition becomes true. See "Assigning a PC Action" on the next page for instructions. **Note**: This button is only available when the Enable box is checked, and you've selected priority 1, 2, or 3. If you select priority 0, the button is grayed out.

Force Data Log Entries on Event

These 14 check boxes correspond to the circuit monitor's 14 data logs. Check the desired boxes for each alarm condition. Each time the alarm condition occurs, the circuit monitor forces an entry into the checked data log files. This provides information that helps characterize the circuit conditions at the time of the event.

Operate Relays on Event

Check the desired relay(s). Each time the alarm condition occurs, the circuit monitor operates (energizes) the specified relays. For example, you could check boxes R1, R2, and R3 for the alarm condition Under Voltage Phase A. Each time the Under Voltage Phase A condition occurs, the circuit monitor operates relays R1, R2, and R3. These relays must be present on the device, enabled for on-board operation, and be in normal, timed, or latched mode. (See "Setting Up Relay Outputs" in this chapter for instructions on setting up circuit monitor relays.)

***Note**: For models CM-2350 and higher, you cannot configure high speed event numbers 201–214 to operate the same relays used for normal events.*

Capture Waveforms on Event

Check the 4-Cycle checkbox if you want the circuit monitor to perform a 4-cycle waveform capture each time the alarm condition occurs. Check the Extended checkbox if you want the circuit monitor to perform an extended waveform capture—12, 24, 36, 48, or 60 cycles—each time the alarm condition occurs. If you check the Extended checkbox, you can enter the number of pre-event cycles (CM-2350 and higher only). The number of pre-event cycles you enter applies to all extended waveforms captured by this device. Only the high-speed input events and event numbers 201–214 use the pre-event cycle selection and allow date/time stamping to the millisecond. For I/O modules IOM-18 and IOM-44, status input S2 is the high-speed input. For any of the four I/O modules with analog I/O, all four status inputs, S1 through S4, are high-speed inputs.

***Note:** A CM-2250 can store only one 4-cycle and one 12-cycle waveform capture in* volatile *memory. If the circuit monitor is a CM-2350 or higher, you can specify multiple waveform captures in* nonvolatile *memory. See "Setting Up the Circuit Monitor On-Board Waveform Capture Logs" in this chapter for instructions on setting up a waveform log file.*

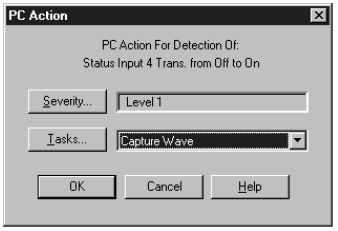
Assigning a PC Action

The PC Action button lets you assign a task to automatically execute when the selected alarm condition becomes true. ***Note****: By default, SMS checks for onboard alarms at 60 second intervals. For instructions on using the SMS configuration program* Smscfg *to change the Onboard Alarm Check Interval, see "Changing the Onboard Alarm Check Interval" below.*

To assign a task to the selected alarm condition, follow these steps:

1. Click the PC Action button.

   SMS displays the PC Action dialog box. SMS automatically assigns the alarm severity level (1, 2, or 3) that matches the priority you selected in the Alarms Setpoints/Delays box. To view or change the defined alarm severity level, click the Severity button.



2. In the Tasks box, select the desired task.

   To define a new task, or to view existing task definitions, click the Tasks button. SMS displays the Tasks dialog box. See "Chapter 7—Using Tasks to Automate Processes" for instructions on defining tasks.

3. Click OK.

   SMS returns to the Onboard Alarms/Events tab.

Changing the Onboard Alarm Check Interval

By default, SMS checks for on-board alarms every 60 seconds. You can change the Onboard Alarm Check interval using the SMS-3000 Configuration program. The SMS-3000 Configuration program, called Smscfg, is located in the SMS-3000 directory on the server machine.) To change the onboard alarm check interval, do the following:

1. Locate the Smscfg program in the SMS-3000 directory and start the program.
2. Click the Intervals tab.
3. In the Onboard Alarm Check box, enter the desired interval in seconds.
4. Click OK to save your changes and exit the configuration program.

Chapter 6—Setting Up Functions and Alarms

What are Alarms?

One of the System Manager software's most powerful features is its ability to generate alarms. Alarms are how SMS warns you that an event of interest has occurred in your power system. You can define an alarm based on any quantity provided by your power monitoring system. Here are a few examples:

Quantity	Alarm defined to…	Benefit
Current	Warn you of an overcurrent condition.	Prevent costly shutdowns and damage to equipment.
Voltage unbalance	Warn you that phase voltages are not balanced.	Voltage unbalance over 3% can cause premature failure of induction motors.
Voltage	Warn you of an undervoltage condition	Low voltage can make equipment more susceptible to shutdown during voltage sags.
Demand	Warn you of high peak demands.	Warn you in advance of peak demands so that you can shed loads and avoid costly peak demand charges.
Transformer Temperature	Warn you of overly high temperatures.	Prevents transformer overloading and damage
Circuit breaker status	Warn you that a circuit breaker has tripped.	Enables you to quickly locate a power problem and repair it.
Total harmonic distortion	Warns you of high levels of harmonic distortion.	Can identify harmonic resonance before fuse failures or capacitor can ruptures occur.

Alarms are Based On Functions

Each alarm is based on one of two types of functions: analog or digital. You'll define analog functions when you want to define an alarm based on an analog quantity. Analog quantities are expressed over a *continuous range* of values; current, voltage, temperature, frequency, and pressure are examples of analog quantities. You'll define digital functions when you want to define an alarm based on a digital quantity. Digital quantities are expressed in only two discrete states, for example *on*/*off*. Examples of digital quantities include circuit breaker status (*open* or *closed*), cooling fan status (*on* or *off*), and the state of a bit (*0* or *1*) in a register.

When you define an analog or digital function, you select a quantity, then define the conditions under which SMS generates the alarm. For example, to define an alarm that

warns you of an overheating transformer, you would define an analog function that specifies:

- the desired quantity—transformer temperature
- the alarm conditions (called *pickup and dropout setpoints*)—the temperature values at which you want the alarm to become active and inactive, along with any desired time delays

The General Alarm Setup Procedure

There are two general tasks you must complete to set up alarms. You'll perform all alarm setup tasks in the Functions Setup dialog box. You access the Functions Setup dialog box by clicking Functions/Alarms on the Setup menu. The Functions setup dialog box has two tabs—Functions and Function Assignment.

The two general tasks that you must complete to set up alarms are:

1. Create global analog and digital functions for a device type, such as the Series 2000 Circuit Monitor.

   This is the heart of the alarm definition process. In this step you will choose the quantities to alarm upon, define the setpoints, assign severity levels, and assign tasks to execute when alarms occur. The section "Creating Global Functions" in this chapter tells how.

2. Assign the global functions you created in step 1 to specific devices.

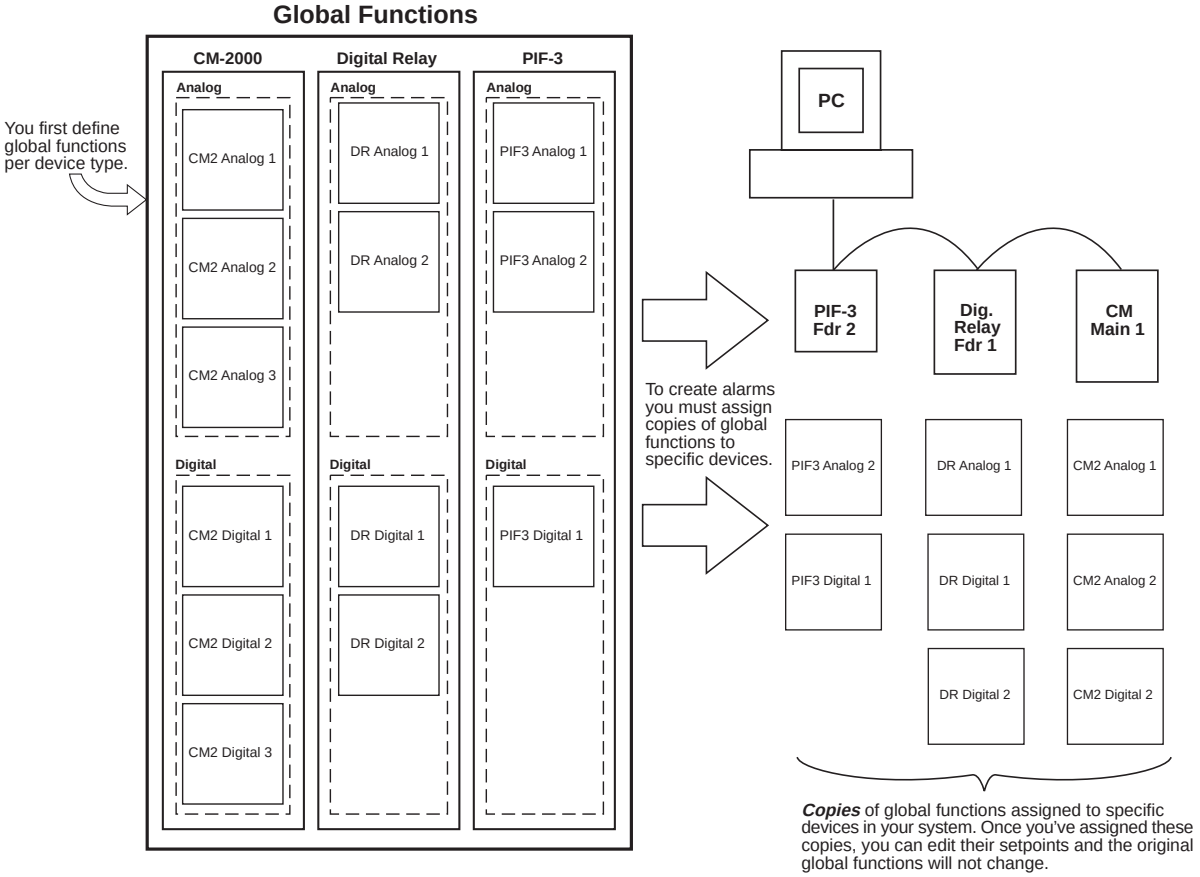
   After you've created global functions for each device type, you must assign them to specific devices in your system so that they can warn you of alarm conditions. The section "Assigning Functions to Specific Devices" in this chapter tells how.

   Note: *It is important to understand the concept of global functions and how they are assigned to specific devices. The next section "Understanding Global Functions" provides further explanation.*

Understanding Global Functions

The illustration below helps to clarify the concept of global functions. For the purpose of clarity, the example POWERLOGIC system shown includes only three devices. Refer to the illustration as you read the following points.

- When setting up functions for alarms, you first define global functions by device type. In the illustration, the user has defined 13 global functions: 6 global functions (3 analog and 3 digital) for the device type CM-2000, 4 for the device type Digital Relay, and 3 for the device type PIF-3.
- Global functions are called global because you can assign a copy to any device (of the correct device type) in the system. For example, in the illustration, the user could assign a copy of the global function CM2 Analog 1 to any Series 2000 Circuit Monitor in the system. If the system had three circuit monitors instead of one, the user could assign the global function CM2 Analog 1 to one, two, or all three circuit monitors. The global function offers tremendous time savings when setting up large systems.



- When you assign a global function to a specific device, SMS makes a copy of the global function and associates it with the device. After you've assigned a copy, you can edit the copy; the original global function will not change.

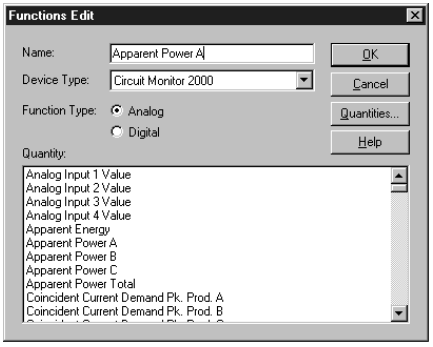
  In the illustration, the user has assigned three functions to the device CM Main 1. When the user assigned the functions (using the Function Assignment tab of the Functions Setup dialog box) SMS made copies of the global functions. If the setpoints of any copied function were not exactly right for the device CM Main 1, the user could edit the copied function's setpoints; the original global function's setpoints would not change. The section "Assigning Functions to Specific Devices" in this chapter tells how to assign copies of global functions to specific devices, and how to edit the copied functions' setpoints.

Creating Global Functions

When you define functions, you first define global functions for a device type—for example a Series 2000 Circuit Monitor. Later, you'll choose from the list of global functions you've defined for that type of device, and assign functions to specific devices—for example, the circuit monitor on Unit Substation Main 1. The section "Assigning Functions to Devices" in this chapter tells how to assign functions to specific devices.

To create a new function, follow these steps:

1. On the Setup menu, click Functions/Alarms.
   SMS displays the Functions Setup dialog box.
2. Click the Functions tab.
3. Click the Add button.
   SMS displays the Functions Edit dialog box.



4. In the Device Types box, select the desired type of device.
5. Select the type of function: Analog or Digital.

6. If you're creating an analog or digital function, click the desired quantity in the Quantity list box. The Name defaults to the quantity name. Edit the name if desired.

   If you wish to create a custom quantity, click Quantities. See "Defining Custom Quantities" in Chapter 16 for instructions on creating a custom quantity.

7. Click OK.

   SMS returns to the Functions tab and adds the new function name to the Functions list.

Once you've completed the steps above to create a new function and assign the desired quantity, you're ready to define the function's setpoints. The setpoints are the conditions under which SMS generates alarms and executes tasks. For example, if you've defined an analog function called Overcurrent Phase A so that you can monitor your Main 1 circuit breaker for abnormal current levels, you'll need to define setpoints that define the abnormal levels. In other words, just how high do you want the current to rise before SMS activates an alarm to notify you.

Defining Setpoints for Analog Functions

After you have created an analog function (see "Creating Functions" above), you must define its setpoints. The setpoints are the conditions under which SMS generates alarms and executes tasks. The procedure below tells how to define setpoints for an analog function. The section following this one shows an example analog function definition.

To define the setpoints for an analog function, follow these steps:

1. In the Functions Setup dialog box, click the Functions tab.

2. In the Functions box, click the desired analog function, then click Setpoints.

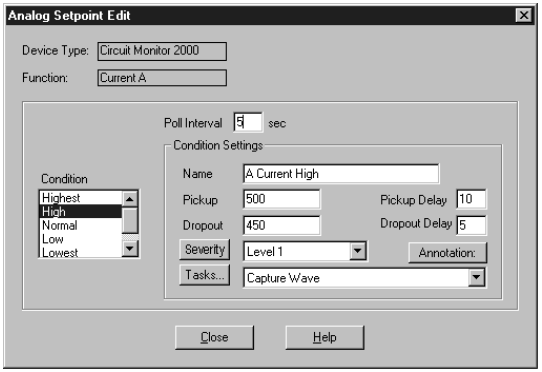
   SMS displays the Analog Setpoint Edit dialog box.

   For each analog function, there are five conditions: highest, high, normal, low, and lowest. You can define condition settings for each of the five conditions, although you cannot enter pickup and dropout setpoints and delays for the Normal condition. You are not required to define condition settings for all five conditions; for example, you may only want to define settings for the High and Low conditions.

3. In the Condition box, click the desired condition.

4. Enter the desired settings in the Condition Settings box as described in the Analog Function Condition Settings table on the next page.

5. Repeat steps 3 and 4 for the desired conditions. When you've finished defining settings for each of the conditions, click Close.



Analog Function Condition Settings Table

At this field …	Do this…
Name	Enter a descriptive name for the selected condition. For example, if you've defined an analog function based on Phase A Voltage, you might name the Highest condition "Phase A Overvoltage."
Pickup	Enter the level at which the condition becomes true. The High and Highest conditions become true when the metered value equals *or* exceeds the pickup level for the time specified in the Pickup Delay box. The Low and Lowest conditions become true when the metered value equals *or* falls below the pickup level for the time specified in the Pickup Delay box. The pickup level does not apply to the Normal condition.
Pickup Delay	SMS multiplies the number you enter in the Pickup Delay box by the number of seconds in the Poll Interval box to determine how long the metered value must *equal or exceed* the Pickup setpoint before the selected Condition becomes true. For example, assume that you are defining setpoints for the High condition. If the Poll Interval = 10 seconds, and the Pickup Delay = 2, the metered value must equal or exceed the Pickup setpoint for a full 20 seconds before the High condition becomes true.
Dropout	Enter the level at which the selected condition ceases to be true. The High and Highest conditions cease to be true when the metered value equals *or* falls below the dropout level for the time specified in the Dropout Delay box. The Low and Lowest conditions cease to be true when the metered value equals *or* exceeds the dropout level for the time specified in the Dropout Delay box. The dropout level does not apply to the Normal condition.
Dropout Delay	SMS multiplies the number you enter in the Dropout Delay box by the number of seconds in the Poll Interval box to determine how long the metered value must *equal or fall below* the Dropout setpoint before the selected Condition is no longer true. For example, assume that you are defining setpoints for the High condition. If the Poll Interval = 10 seconds, and the Dropout Delay = 2, the metered value must equal or fall below the Dropout setpoint for a full 20 seconds before the High condition returns to Normal.
Severity	Click to assign an alarm severity level (from 0 to 9) to the selected condition. When the selected condition becomes true (that is, when the Pickup setpoint

	and delay have been satisfied) SMS generates an alarm. If you do not want the software to generate an alarm when the condition becomes true, click No Alarm. The manner in which SMS notifies you of an alarm—for example, visual, audible, and so on—depends on the severity level you choose. To edit the severity levels, click the Severity button. System Manager displays the Severity dialog box. See "Setting Up Alarm Severity Levels" in this chapter for instructions on editing severity levels.
Annotation	Click this button to attach an annotation to the alarm. A user can read the annotation when viewing the active alarms list. You might use this feature to record written instructions that an operator could follow when an alarm occurs.
Tasks	Select a task if you want SMS to execute the task when the monitored value exceeds the Pickup setpoint *and* Pickup delay. Choose from the list of predefined tasks, or click the Task pushbutton to create a new task. For instructions on creating tasks, see "Chapter 7—Using Tasks to Automate Processes."
Poll Interval	Enter a poll interval (in seconds) at which SMS will check for the alarm condition. You can enter unique poll intervals for each function. The poll interval is also used in calculating delays; see the descriptions of Pickup Delay and Dropout Delay above. To enter a poll interval at least one condition must be set to an alarm level other than "No Alarm." Note: If you do not enter a poll interval, SMS will not check for alarms. A function with no poll interval is useful only for control outputs and for use with the Interactive Graphics software.

Analog Function Example

Assume that you have a circuit monitor equipped with an analog input/output module. One analog input is monitoring the fluid level in a tank. If the fluid level in the tank rises too high, there is danger of a spill. If the fluid level falls too low, there is risk of damage to equipment.

You want SMS to generate alarms that warn you of dangerously high or low fluid levels, so you define an analog function called "Tank Level." In the Analog Setpoints Edit dialog box, you define condition settings for *each* condition. The table on the next page shows the values you enter.

The five condition levels allow you to set up alarms that warn you before the tank level becomes critically high or low (using the high and low condition levels), and when the tank level is critically high or low (using the highest and lowest condition levels).

Your plant operator asks you to explain what you've done. You offer the following explanation:

When the fluid level in the tank rises above 32 feet (the Tank High pickup level) and remains above 32 feet for 20 seconds (the Tank High pickup delay), SMS generates a level 5 alarm and logs the alarm in the alarm log. If the fluid level continues to rise and exceeds 38 feet (the Spill Imminent pickup level) and remains above 38 feet for 10 seconds (the Spill Imminent pickup

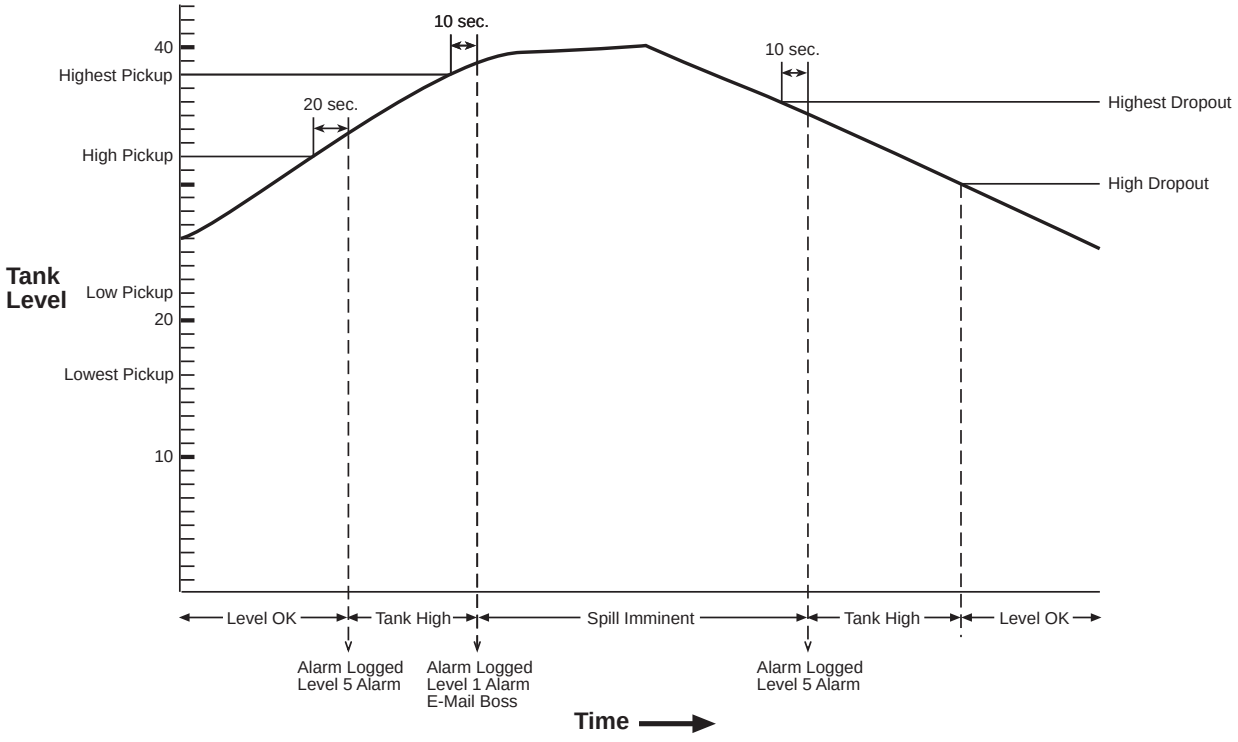
delay) SMS generates a level 1 alarm, logs the alarm in the alarm log, and executes the task E-mail Boss, which automatically sends an e-mail message to the plant operations manager warning him of the dangerously high fluid level.

When the fluid level in the tank drops below 22 feet (the Tank Low pickup level) and remains below 22 feet for 20 seconds (the Tank Low pickup delay), SMS generates a level 5 alarm and logs the alarm in the alarm log. If the fluid level continues to drop and falls below 16 feet (the Critically Low pickup level) and remains below 16 feet for 10 seconds (the Critically Low pickup delay) SMS generates a level 1 alarm, logs the alarm in the alarm log, and executes the task E-mail Boss.

To clarify, you draw the sketch on the following page.

Analog Function Name Tank Level

Condition	Condition Settings							
	Condition Name	**Pickup**	**Pickup Delay**	**Dropout**	**Dropout Delay**	**Alarm**	**Task**	**Poll Interval**
Highest	Spill Imminent	38	2	36	2	Level 1	E-mail Boss	5
High	Tank High	32	4	30	0	Level 5	None	5
Normal	Level OK	n/a	n/a	n/a	n/a	No Alarm	None	
Low	Tank Low	22	4	24	0	Level 5	None	5
Lowest	Critically Low	16	2	18	2	Level 1	E-mail Boss	5



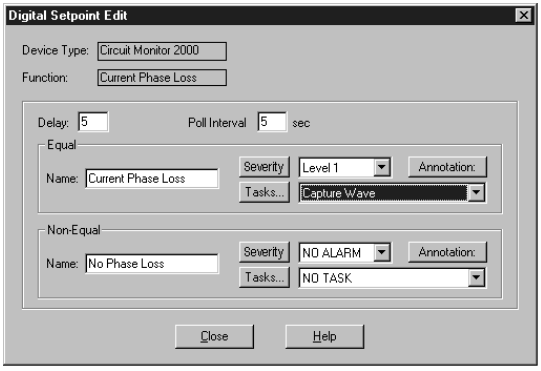
Analog Function Tank Level Example

Defining Setpoints for Digital Functions

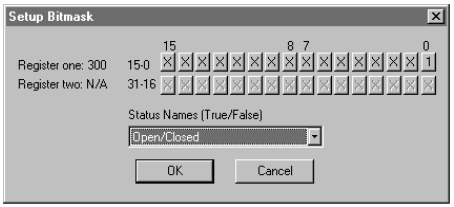
After you have created a digital function (see "Creating Functions" earlier in this chapter), you must define its setpoints. The setpoints are the conditions under which SMS generates alarms and executes tasks. The procedure below tells how to define setpoints for a digital function. An example digital function definition follows.

To define the setpoints for a digital function, follow these steps:

1. In the Functions Setup dialog box, click the Functions tab.
2. In the Functions box, click the desired digital function, then click Setpoints.
   SMS displays the Digital Setpoint Edit dialog box.



3. Enter the desired settings in the dialog box.
   See the Digital Function Setpoint table on the next page for a description of each item in the dialog box.
   Note: If you defined the function using a pre-defined digital quantity, the Equal condition is true when the monitored bit is On (bit = 1), and the Non-Equal condition is true when the monitored bit is Off (bit = 0). If you defined the function using a digital *custom quantity*, the Equal condition is true when the bits in the monitored register match (are equal to) the bitmap you defined when creating the custom quantity. For example, assume that you've defined the custom quantity bitmap as follows:



When bit 0 of the monitored register = 1, the Equal condition is true. When bit 0 = 0, the Non-Equal condition is true. If you had set the bitmap as shown below, then when bit 0 = 0, the Equal condition would be true. When bit 0 = 1, the Non-Equal condition would be true.

Note: The time delay must also be satisfied before a condition becomes true. See the description of Delay in the table below.

4. When you've finished defining settings, click close.

Digital Function Setpoint Table

At this field…	Do this…
Name	Enter descriptive names for the Equal and Non-Equal conditions. For example, if you've chosen the quantity "Input 1 Status," and input 1 monitors the status of a cooling fan, you might assign the name "Fan On" to the Equal condition, and the name "Fan Off" to the Non-Equal condition.
Delay	SMS multiplies the number you enter in the Delay box by the number of seconds in the Poll Interval box to determine the time delay before a condition becomes true. For example, if the Poll Interval = 10 seconds, and the Delay = 2, the Equal condition will be true only after the bit(s) in the monitored quantity are in the Equal state for a full 20 seconds.
Poll Interval	Enter a poll interval (in seconds) at which SMS will check the state of the bit. The poll interval is also used in calculating the delay. See the description of Delay above. The default poll interval is 10 seconds.
Severity	Click to assign an alarm severity level (from 0 to 9) to the selected condition. When the selected condition becomes true—that is when the bit is in the desired state for the specified time delay—SMS generates an alarm. If you do not want the software to generate an alarm when the condition becomes true, click No Alarm. The manner in which SMS notifies you of an alarm—for example, visual, audible, and so on—depends on the severity level you choose. To edit the severity levels, click the Alarms button. SMS displays the Alarms dialog box. See "Setting Up Alarm Severity Levels" in this chapter for instructions on editing severity levels.
Annotation	Click this button to attach an annotation to the alarm. A user can then read the annotation when viewing the active alarms list. You might use this feature to record written instructions that an operator could follow when an alarm occurs.
Tasks	Select a task if you want SMS to execute the task when the condition becomes true. Choose from the list of predefined tasks, or click the Tasks button to create a new task. For instructions on creating tasks, see "Chapter 7—Using Tasks to Automate Processes."

Setting Up Alarm Severity Levels

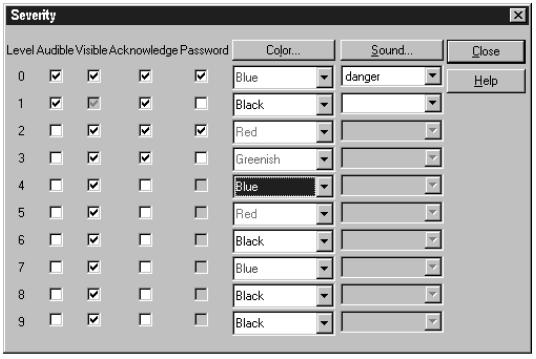
Follow these steps to set up alarm severity levels:

1. In the Analog Setpoint Edit or Digital Setpoint Edit dialog box, click the Severity button.

   SMS displays the Severity dialog box.

2. Enter alarm information for up to ten levels as described in the Alarm Level table below.

For each severity level, there are six characteristics that you can apply. To select a characteristic, click the corresponding checkbox or choose from the drop down list box.



Alarm Level table

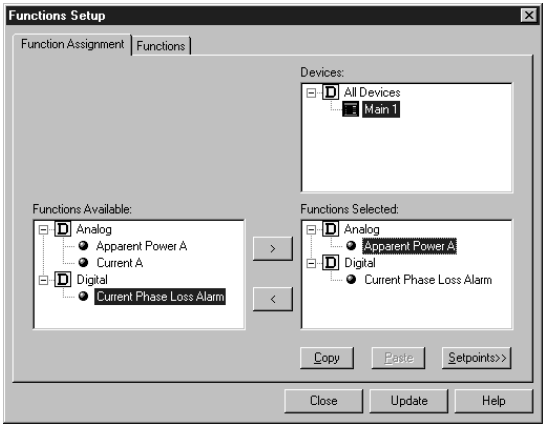
At this field…	Do this…
Audible	Check this box to make the PC sound when the alarm occurs. The sound alerts the user to examine the Alarms List window. A sound can be any wave file (.wav). Select a specific sound from the Sound list box, described below.
Visible	Check this box to make the Active Alarms window display when an alarm occurs. If the Active Alarms window is reduced to an icon, the icon will flash. To assign a color to the text that appears in the Active Alarms entry, select a color from the Color drop down list box, described below.
Acknowledge	Check this box to force the user to respond to the alarm. When an alarm occurs, the Alarm Acknowledgment window displays. To clear the window, the operator must acknowledge each alarm in the list. The Alarm Log lists the date, time, and user name of the user who acknowledges an alarm.
Password	Check this box to force the operator to enter a password to acknowledge the alarm.
Color	Click the color that you want the alarm entry to be in the Active Alarms and Alarm Acknowledgment windows. To add colors, click the Color button.
Sound	Click the sound that you want to hear when the alarm occurs. To add a sound, click the Sound button and select a wave (.wav) file. Note: We recommend that you select sounds that are short because the next alarm in not annunciated until the current alarm's sound has finished.

Assigning Functions to Specific Devices

After you've defined global functions for a device type such as a circuit monitor, you must assign those functions to specific devices in the system—for example, the circuit monitor on unit substation 1's main circuit breaker. This concept is explained in greater detail in the section "Understanding Global Functions" at the beginning of this chapter.

To assign functions to a device, follow these steps:

1. On the Setup menu, click Functions/Alarms….
2. Click the Function Assignment tab.



3. In the Devices box, click the desired device.

   All global functions that you have defined for the selected device type appear in the Functions Available box (under the groupings Analog and Digital). For example, if the selected device is a Series 2000 Circuit Monitor, only the analog and digital functions that you have defined for the device type Series 2000 Circuit Monitor appear in the Functions Available box.

4. In the Functions Available box, click a function that you want to assign to the selected device, then drag it to the Functions Selected box, or use the > button.
5. Repeat step 4 to assign additional functions to the selected device.

Editing a Function After You've Assigned It to a Device

When you choose a global function from the Functions Available box and assign it to a specific device, SMS makes an exact copy of the function and associates it with the selected device. The functions that appear in the Functions Selected box are *copies* of the global functions. Because they are copies, you can edit their setpoints without affecting the original global function.

For example, you could assign an analog function called "Overcurrent Phase A" to the device called "Assmbly CM1." You could then select the "Overcurrent Phase A" function in the Functions Selected box and edit its setpoints. The changes you make to the function affect only the copy of the Overcurrent Phase A function that is assigned to the device Assmbly CM1; the global Overcurrent Phase A function (which appears in the Functions Available box) remains unchanged. To edit the global Overcurrent Phase A function, you must go to the Functions tab of the Functions Setup dialog box, since that is where you defined the original global function. You must then reassign the edited global function to each device that you want the global function copied to.

To edit the *copy* of a function after you've assigned it to a specific device:

1. On the Function Assignment tab, click the desired device in the Devices box.
   The functions that you've assigned to the selected device appear in the Functions Selected box.
2. In the Function Selected box, click a function to edit.
3. Click the Setpoints button.
   SMS displays the Setpoints Edit box.
4. Make the desired changes to the setpoints and click OK.

Chapter 7—Using Tasks to Automate Processes

A task is an automated process that SMS executes. (The Task feature replaces the Macro feature in earlier versions of SMS.) There are two ways that tasks can be executed:

- Tasks can be launched by an alarm condition.

  For example, you could define a task called "GetCMlog" that retrieves the on-board log files from a circuit monitor and combines them with the SMS database on your PC's hard disk. You could then define a function that generates an alarm and launches the task Getcmlog each time the circuit monitor has an overcurrent alarm.

- Tasks can be scheduled to execute automatically at a user-defined time.

  For example, you might create a scheduled task that automatically performs resets on the first day of each month.

There are several types of tasks:

- Mail tasks—A mail task uses Microsoft Mail to automatically send an e-mail message. For example, you could create a task that sends an e-mail message to the plant engineer when an alarm occurs.
- Program tasks—A program task automatically launches an executable program. For example, you could create a task that launches a program that activates the plant engineer's beeper when an alarm occurs.
- Reset tasks—Reset tasks reset device data such as min/max logs, onboard data logs, waveform capture logs, device clock time, and so on.
- CM2000: Onboard Data Log/Waveform Upload tasks—These tasks automatically upload onboard data log and/or waveform files from series 2000 circuit monitors and combine them with the SMS database on your PC's hard disk.

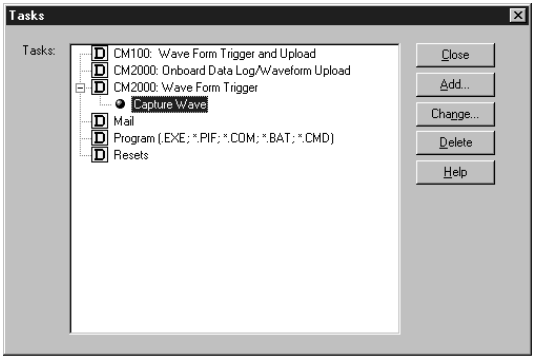
This chapter has three sections. The first section "Creating New Tasks" tells how to create new tasks. The second section "Scheduling Tasks" tells how to schedule tasks to be automatically executed at a user-defined time. The third section "Assigning a Task to a Function" tells how to assign a task to an analog or digital function's alarm condition so that the task executes when the alarm condition becomes true.

Creating New Tasks

You create new tasks using the Tasks dialog box. You can display the Tasks dialog box in two ways:

- Click Scheduled Tasks on the Setup menu, then click the Tasks pushbutton
- Click the Tasks button in the Analog Setpoint Edit or Digital Setpoint edit dialog box

In both cases, SMS displays the Tasks dialog box shown below. Use the Tasks dialog to create new tasks as described in the following sections.



Creating a New Mail Task

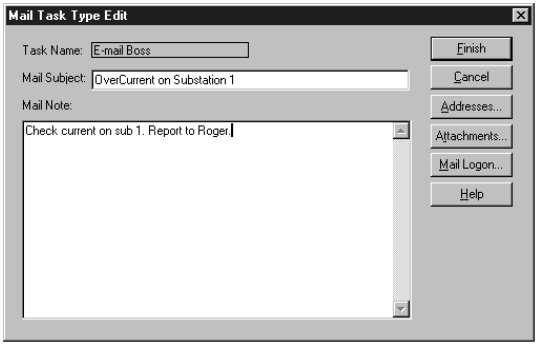
The following instructions assume that Microsoft Mail is already installed and working properly. See your Microsoft documentation for instructions on installing and using Microsoft Mail.

To create a new mail task, follow these steps:

1. Click Add. The New Task dialog box displays.

2. Type the Task Name, up to 255 ASCII characters (no spaces).

3. In the Task Type box, select Mail then click Continue.
   SMS displays the Mail Task Type Edit dialog box.



4. Enter information in the dialog box as described in the Mail Task Edit table. Click OK when done.

   SMS returns to the Tasks dialog box.

Mail Task Edit Table

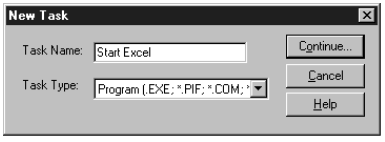
At this field…	Do this…
Mail Subject	Type a brief description of the e-mail.
Mail Note:	Type the message you want to send.
Addresses	Click to display the Addresses dialog box. Then select the users to whom the message will be sent.
Attachments	Click to display the Mail Attachments dialog box. Then select the files to send as Mail Attachments.
Mail Logon	Click to enter your Microsoft Mail User ID & Password. If Mail is not running when the Mail Task is be launched, SMS will launch Mail and use the User ID & Password to log on.
OK	Click when you've finished defining the mail task.
Cancel	Click to leave the screen without saving changes.

Creating a New Program Task

Note: *Program tasks are executed on the PowerLogic Network Server PC only. The program being executed must be located on the hard drive of the Network Server PC. For this reason, you should create the tasks on the Server PC. Scheduled program tasks execute based on the server PC's clock.*

To create a new program task, follow these steps:

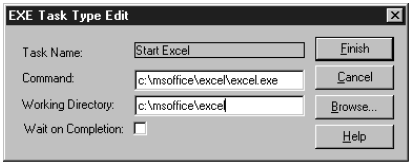
1. Click Add. The New Task dialog box displays.



2. Type the Task Name, up to 255 ASCII characters (no spaces).

3. In the Task Type box click Program, then click Continue.

   SMS displays the EXE Task Type Edit dialog box.



4. Enter information in the dialog box as described in the EXE Task Type Edit table. Click Finish when done.

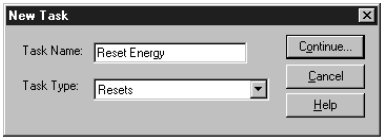
   SMS returns to the Tasks dialog box.

EXE Task Type Edit Table	
At this field…	**Do this…**
Command:	Type the command line which includes the location and name of the executable program and any optional command line parameters, or click in the Command box, then click the Browse button to locate the executable.
Working Directory:	Type the working directory that the executable program will use.
Wait On Completion:	When you check this box, the task will not be logged in the event log until the executable program has finished running.
OK	Click when you've finished defining the program task.
Cancel	Click to leave the screen without saving changes.

Creating a New Resets Task

To create a new reset task, follow these steps:

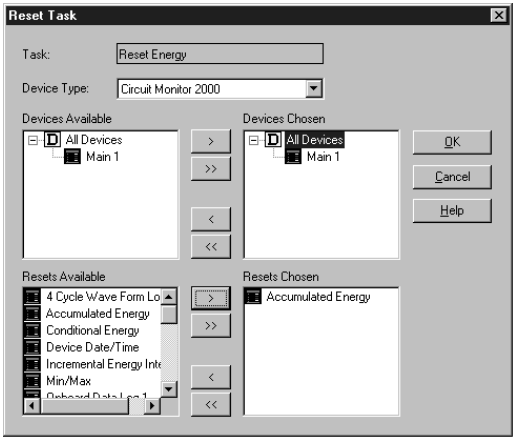
1. Click Add. The New Task dialog box displays.



2. Type the Task Name, up to 255 ASCII characters (no spaces).

3. In the Task Type box click Resets, then click Continue.

   SMS displays the Reset Task dialog box.



4. In the Device Type box, select the type of device.

5. In the Devices Available box, click the desired devices and drag them to the Devices Chosen box, or use the < > buttons.

6. In the Resets Available box, click the desired resets and drag them to the Resets Chosen box (or use the arrow buttons).

7. Click OK when done.

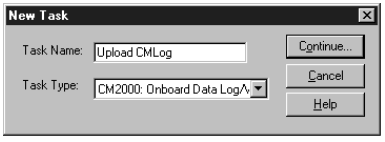
   SMS returns to the Tasks dialog box. The new Resets task appears in the Tasks list.

Creating a New CM2000 Onboard Data Log/Waveform Upload Task

Note: *Before creating an onboard data log/waveform upload task, reset the waveform log using the Resets command on the Control menu. This prevents old waveform data from being uploaded when the waveform upload task executes.*

To create an onboard data log/waveform upload task, follow these steps:

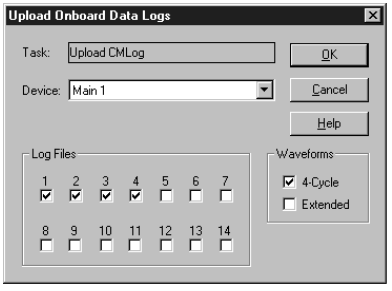
1. Click Add. The New Task dialog box displays.



2. Type the Task Name, up to 255 ASCII characters (no spaces).

3. In the Task Type box click CM2000 Onboard Data Log Upload, then click Continue.

   SMS displays the Upload Onboard Data Logs dialog box.



4. In the Device box, select a Series 2000 Circuit Monitor (CM-2150 or higher).

5. In the Log Files box, check the data logs to upload.

6. If you want to upload the 4-cycle waveform log, check the 4-cycle waveforms box. If you want to upload the extended waveform log, check the Extended waveforms box.

7. Click OK.

   SMS returns to the Tasks dialog box. The new task appears in the Tasks list.

Scheduling Tasks

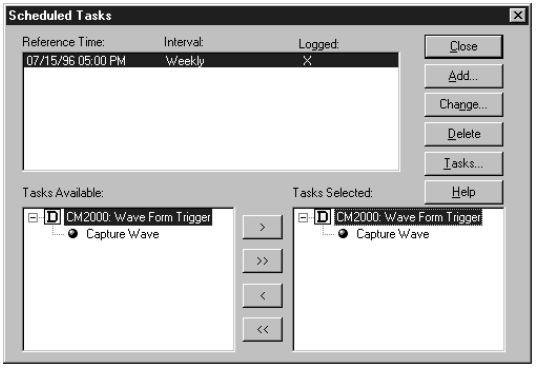
After you've created tasks, you can schedule them so that SMS automatically executes them at a user-defined time and interval. Except for tasks setup to execute only once, scheduled tasks run repeatedly at the scheduled time and interval until you stop them.

To schedule tasks, you must first create reference times—the time and interval at which you want the task to run—then assign tasks to run at specific reference times.

Creating a New Reference Time

To create a new reference time, follow these steps:

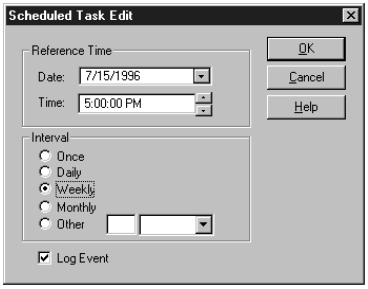
1. On the Setup menu, click Scheduled Tasks.
   SMS displays the Scheduled Tasks dialog box.



2. Click Add to display the Scheduled Task Edit dialog box. Enter information in the dialog box as described in the Scheduled Task Edit table, on the next page.

3. Click OK when you've finished entering information in the Scheduled Task Edit box.
   The new reference time appears in the Reference Time list box.

4. Assign one or more tasks to the reference time as described on the next page.



Scheduled Task Edit Table

At this field…	Do this…		
Date	Enter the date (MM/DD/YY format) on which the task will begin running. If you start a monthly task on the 31st of a month, the task will not execute on a month with 29 or 30 days.		
Time	Enter the time of day at which the task will run. SMS executes tasks based on the POWERLOGIC Network Server PC's clock.		
Interval	Click the button for the desired interval:		
	once	=	one time only at the specified time
	daily	=	seven days a week at the specified time
	weekly	=	once a week, the same day every week, beginning with the specified date
	monthly	=	once a month, on the same day, beginning with the specified date
	other	=	enter a number and choose an interval from the drop down list box; for example "3 Days"
Log Event	Check this box to cause the task to be logged in the event log each time it runs.		

Assigning Tasks to a Reference Time

To assign tasks to a reference time, follow these steps:

1. In the Reference Time box, click the desired Reference Time.
2. In the Tasks Available box, click a Task you want to assign to the selected Reference Time and drag it to the Tasks Selected box (or use the > button).
3. Repeat step 2 to assign additional tasks to the reference time.

Changing and Deleting a Reference Time

To change a reference time, follow these steps:

1. Click the reference time, then click Change.
2. Make the desired changes in the Scheduled Task Edit dialog box, then click OK.

   Any tasks that you've assigned to the reference time will now run at the new time and interval.

To delete a reference time, follow these steps:

1. Click the reference time in the Reference Time box, then click Delete.

   Any tasks that you had assigned to the reference time will no longer run at the reference time. Note: This does not delete the task, it only stops the selected tasks from automatically executing at the deleted reference time.

Setting the PC's Clock

SMS executes scheduled tasks based on the POWERLOGIC Network Server PC's clock. To set the clock on the Network Server PC, use the Windows NT control panel called Date/Time. If the Network Server is running when you advance the PC clock past a task's schedule execution time, the task executes immediately. To avoid this, shut down the POWERLOGIC Network Server while setting the PC's clock.

Chapter 8—Viewing Alarms and Events

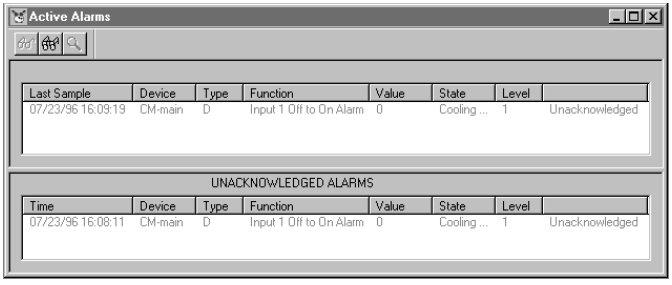
Viewing and Acknowledging Active Alarms

When an alarm becomes active, SMS adds it to the Active Alarms list. Depending on the selections you made when setting up the alarm levels, SMS may also do any or all of the following:

- sound an audible signal
- flash the alarm list icon
- automatically display the active alarms list and force you to acknowledge the alarm
- require you to enter a password to acknowledge the alarm

To view the active alarms list at any time, click Active Alarms on the Window menu. SMS displays the Active Alarms list, shown below. The top part of the alarm list shows all active alarms. The bottom part shows required acknowledgment alarms that have not yet been acknowledged.

If an alarm becomes active, and its assigned alarm level has been set up for required acknowledgment and/or visible, you won't need to display the alarm list; SMS will display it automatically. It will even interrupt you and display the alarm list if you are working in another Microsoft Windows application, such as Microsoft Excel or Microsoft Word.



To acknowledge an active alarm, follow these steps:

1. Click the alarm in the Unacknowledged Alarms list.

2. Click the eye glasses icon to acknowledge only one active alarm (or click the double eye glasses icon to acknowledge all active alarms). If the alarm requires a password, enter your assigned user id and password.

   The alarm disappears from the Unacknowledged Alarms list. It will remain in the Active Alarms list as long as the alarm condition is true. When the alarm condition is no longer true, it will disappear from the Active Alarms list. To view a history of alarms, see "Viewing the Alarm Log" below.

Using Operator Assistance Procedures During an Alarm

When defining functions, you can enter text (called an annotation) that is saved with the function definition. The text can include step-by-step procedures telling an operator what to do when the alarm is active. To view the annotation, double-click the desired alarm, or click the alarm then click  .

Remote Acknowledgment

One of the benefits of SMS's client/server architecture is that a remote PC equipped with a modem and a client version of SMS can dial in to the server PC and acknowledge alarms. For example, a plant engineer could install a client version of SMS on a PC in his home. Using a modem, he could dial in to the server at the plant. The engineer could then view the alarm list and acknowledge active alarms exactly as he would if he were at the plant.

Silencing Alarms

If an alarm has been set up for audible notification, SMS sounds the audible when the alarm becomes active. The audible plays repeatedly until you do one of the following:

- Acknowledge the alarm as described in "Viewing and Acknowledging Active Alarms," or
- Silence the alarm

If multiple audible alarms are active at one time, SMS plays the audibles alternately in a repeating cycle.

To silence all active alarms, follow these steps:

1. Click the Silence All Alarms icon  on the toolbar.

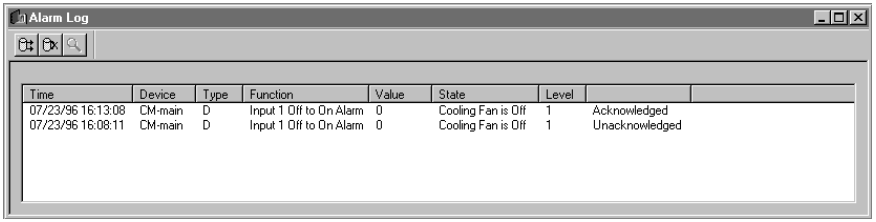
   This will not clear the unacknowledged alarms from the alarm list, or make the alarms inactive, it only stops the audible portion of the alarm.

Viewing the Alarm Log

Each time an alarm occurs, SMS records the alarm occurrence in the alarm log.

To view the alarm log, follow these steps:

1. On the Windows menu, click Alarm Log.
   SMS displays the Alarm Log Window.



To view the alarm detail window, double-click the desired alarm, or click the alarm then click .

Purging the Alarm Log

Periodically, you may wish to purge the alarm log . When you purge the alarm log, SMS deletes the specified alarms from the SMS database. This will not delete any other information, such as historical data, stored in the database. Use this feature with caution—once you purge the alarm log, you cannot recover the deleted alarm data.

To purge the alarm log, follow these steps:

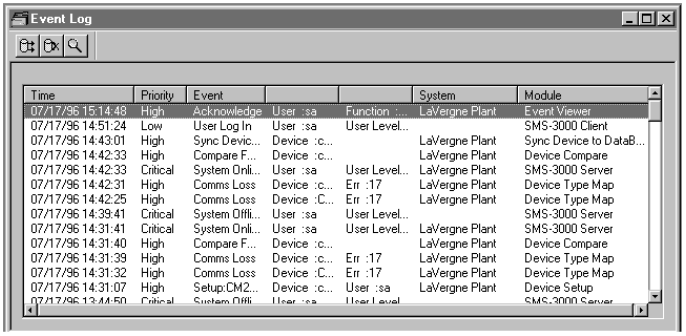
1. On the Windows menu, click Alarm Log to view the alarm log.
2. Click the purge button .
   SMS asks for your username and password.
3. Enter your username and password, and click OK.
   SMS displays the Log Delete Options dialog box.
4. Select All to delete all entries, or enter a date range, then click OK.
   SMS deletes the specified data.

Viewing the Event Log

The event log stores events that are related to the operation of SMS. Some of the events that are stored in the event log include: user log in, changes to system setup, system taken offline, system placed online, tasks executed, and devices that have lost communications.

To view the event log, follow these steps:

1. On the Windows menu, click Event Log.
   SMS displays the Event Log window.



To view the event detail window, double-click the desired event, or click the event then click .

Purging the Event Log

Periodically, you may wish to purge the event log. When you purge the event log, SMS deletes the specified events from the SMS database. This does not delete other information, such as historical data, stored in the database. Use this feature with caution—once you purge the event log, you cannot recover the deleted events.

To purge the event log, follow these steps:

1. On the Windows menu, click Event Log to view the event log.
2. Click the delete button .
   SMS asks for your username and password.
3. Enter your username and password, and click OK.
   SMS displays the Log Delete Options dialog box.
4. Select All to delete all entries, or enter a date range, then click OK.
   SMS deletes the specified data.

Chapter 9—Data Logging

SMS can log historical data to a computer's hard disk. You can view historical data in table format or as a time trend plot. "Chapter 10—Displaying Historical Data" tells how to display history tables and time trend plots. Historical data is useful for troubleshooting problems, identifying trends in usage, tracking equipment loading to identify excess capacity, and more.

SMS logs all historical data to the SMS database on your computer's hard disk. This is the same database that stores all of the device setup information, function definitions, and other user-defined data. Depending on the choices made during installation, the database may be stored on the server computer, or on any other computer on the local area network. The computer on which the database is installed must have enough available hard disk space for data logging. The amount of disk space needed depends on the limits you've set for the data log—such as the maximum number of quantities selected, the polling interval (10 minutes, 15 minutes, etc.), and the total number of days to store in the database. For instructions on database configuration, see the *System Administrator's Guide.* The guide also offers instructions on archiving historical data and deleting it from the database.

The table below summarizes the locations of information related to setting up, logging, and displaying historical data.

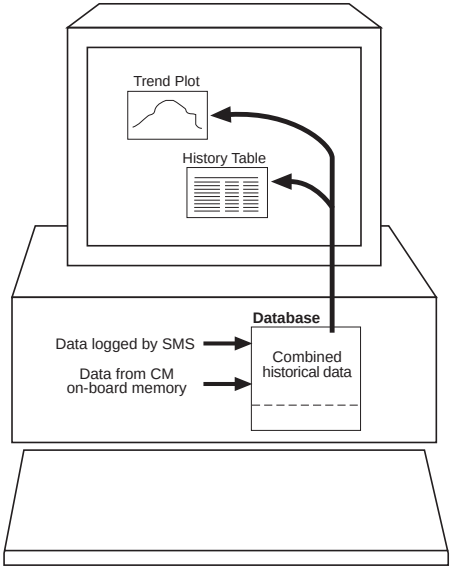
To learn how to:	See the section:	In chapter:
Set up data logging	Setting Up Data Logging	9
Set up circuit monitor on-board memory	Setting Up On-board Data Storage	5
Display historical data in a table or trend plot	Displaying a History Table or Time Trend Plot	10
Display circuit monitor on-board data	Displaying Circuit Monitor On-board Data	17
Delete historical data from the SMS database	*System Administrator's Guide*	—
Archive historical data from the SMS database	*System Administrator's Guide*	—

Circuit Monitor On-Board Data Log Files

Series 2000 POWERLOGIC Circuit Monitors have on-board memory for logging historical data. The amount of memory available depends on the circuit monitor model. You can set up a circuit monitor's on-board memory using SMS; the section "Setting Up On-Board Data Storage" in Chapter 5 tells how.

SMS can automatically retrieve the data from circuit monitor on-board data log files and store it in the SMS database on the computer's hard disk. This combines the data logged by the circuit monitor with the data logged from devices that do not have on-board logging capabilities. When you view a history table or time trend plot, SMS retrieves the

historical data from the database; the data retrieved includes both data automatically retrieved from circuit monitor on-board memory, and data logged directly to the database by SMS. The figure below illustrates this concept.



For each series 2000 circuit monitor with onboard memory, you must define an Onboard Data Log Upload task that specifies which log files to retrieve and how often to retrieve them. See "Chapter 7—Using Tasks to Automate Processes" for instructions on defining Onboard Data Log Upload tasks.

Although SMS can automatically retrieve data from circuit monitor on-board memory and combine it with the database, there may be times when you want to retrieve on-board data directly from a circuit monitor and view it. SMS provides this capability as well. The section "Displaying Circuit Monitor On-Board Data" in Chapter 17 tells how.

Setting Up Data Logging

To set up data logging, you must do two things:

1. Create log templates.

   In creating a log template, you'll specify the dates and times to start and stop logging, the logging interval (for example, do you want to log data hourly, daily?), and the quantities to be logged. Since each device type supports different quantities, you'll create device-specific log templates; that is, you'll create one set of templates for series 2000 circuit monitors, one set for POWERLOGIC Digital Relays, and so on.

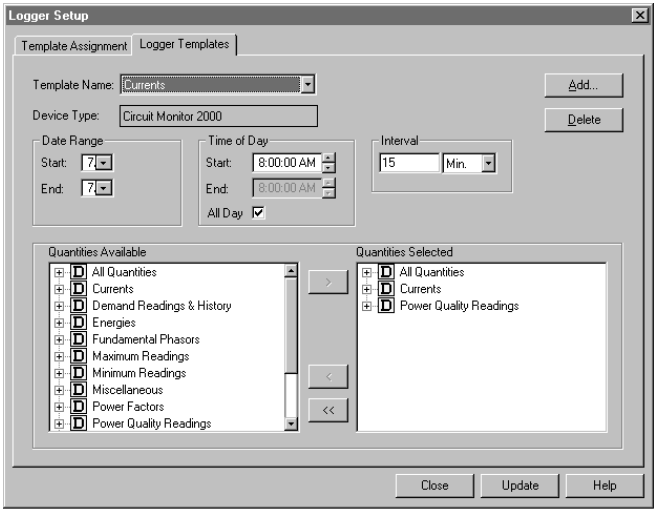
2. Assign the templates to specific devices.

Creating Log Templates

To create a new log template, follow these steps:

1. On the Setup menu, click Logging…
   SMS displays the Logging Setup dialog box.

2. Click the Logger Templates tab.



3. Click Add.
   SMS displays the Template Name dialog box.

4. Enter a template name.

5. In the Device Type box, click the device type for which you'll create a template. Click OK.

6. In the Date Range box, enter the dates you want data logging to start and end.
   For example, if you want to log data for a period of one month starting today, enter the present date in the start box, and the date one month from present in the end box. If you don't enter an end date, SMS keeps logging until your computer's disk is full, or until you deactivate the logging template. The next section "Assigning Log Templates to Specific Devices" tells how to assign and activate log templates.

7. In the Time of Day box, enter the times for data logging to start and end each day, or check All Day.
   For example, you might only want to log data from 8 a.m. to 4:00 p.m. daily. To log continuously, do not enter anything in the date/time fields.

8. In the Interval box, enter the time interval at which you want data to be logged (for example, every 15 minutes, hourly, daily, etc.).

   Keep in mind that the smaller the log interval, the quicker you'll consume hard disk space on your computer. Be sure that you have adequate hard disk space for data logging.

9. In the Quantities Available box, click the desired quantities and drag them to the quantities selected box, or use the > button.

10. Repeat steps 3–9 to create additional templates.

After you've created templates, you'll need to assign them to specific devices and activate them. You'll do this on the Template Assignment tab. The next section tells how.

Note: *We recommend that you assign only one log template to each device. Assigning multiple templates to a single device can slow system communications. For example, assume that you had a "Mains" group and a "Feeders" group, and that you want to log voltages and currents on the Mains, but only currents on the Feeders. Do not create a "Voltages" template and a "Currents" template and apply both to the Mains, and only the currents template to the Feeders. Instead, create a template called "Mains" that includes voltages and currents, and a template called "Feeders" that has only currents.*

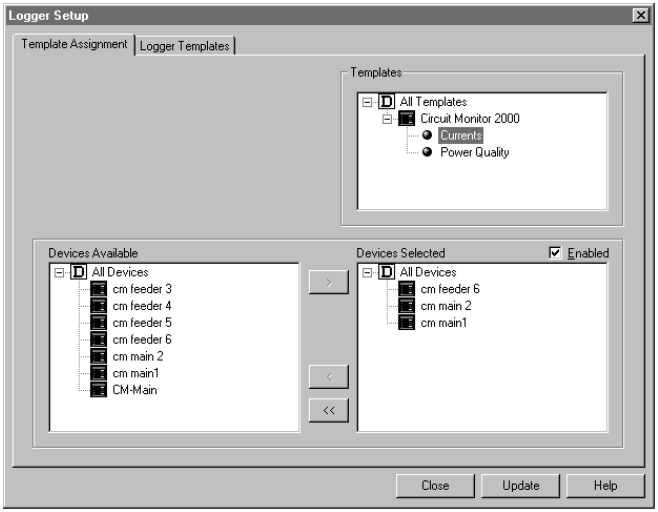
Assigning Log Templates to Specific Devices

After you've created log templates as described above, you must assign them to specific devices; you assign templates on the Template Assignment tab of the Logging Setup dialog box. If you are not already viewing the Logging Setup dialog box, click Logging… on the Setup menu to display it.

When you assign log templates on the Template Assignment tab, you are preparing SMS to log data directly to the System Manager database on a computer's hard disk. You can also assign log templates to Series 2000 Circuit Monitors to configure their on-board memory, see "Setting Up Circuit Monitor On-Board Memory" in Chapter 5 for instructions.

To assign log templates to one or more devices that do not have onboard logging capability, follow these steps:

1. In the Logger Setup dialog box, click the Template Assignment tab, shown on the next page.



2. In the Templates box, click a template to assign to the devices.

   The available devices appear in the Devices Available box; only the devices that match the device type for which the logging template was created are listed.

3. In the Devices Available box, click the devices that you want to assign the template to and drag them to the Devices Selected box, or use the > button.

4. Check the Enabled checkbox to enable the template.

   If the system you are editing is online, and you did not enter a start time and date, SMS starts logging immediately after you close the Log Setup dialog box. If the system you are editing is not online, SMS starts logging the next time you place the system online.

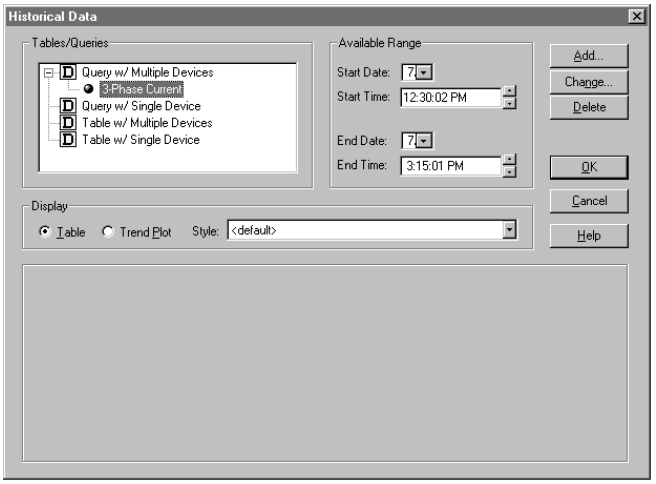
5. To assign another template, repeat steps 2–4. Be sure to check the Enabled checkbox for each template.

After assigning all templates, click Close. SMS prompts you to save the changes you've made.

Chapter 10—Displaying Historical Data

SMS lets you view historical data in table format or as a time trend plot. This chapter tells how to display history tables and time trend plots. Note that before you can display history tables or time trend plots, you must have already logged data. “Chapter 9—Data Logging” tells how to set up and activate data logging.

To display historical data, click Historical Data on the Display menu. SMS displays the Historical Data dialog box.



To display a history table or time trend plot, you’ll select from the pre-defined history tables or create your own tables from the historical data that has been logged. You can also define a query. Queries are similar to tables except that the device names you select are saved with the query; the next time you want to display the query, you won’t need to select devices. For a table, you must pick the device (or devices) each time.

***Note**: Tables and queries can be used to display historical data in table format* **or** *as a trend plot. For example, you can select a Table w/Multiple Devices in the Tables/Queries box then display either a table or a trend plot.*

How do you decide if you need to define queries or tables? It depends on the application. Assume the following:

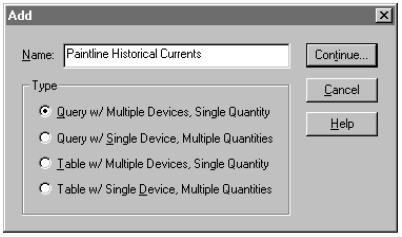
- You have a system of five circuit monitors, one monitoring a main and four monitoring feeders
- You have logged power quality values for the main circuit monitor only
- You have logged per-phase and three-phase current values for all circuit monitors

Since you've logged power quality values for the main circuit monitor only, you'd probably define a Query w/Single Device to display power quality values. A query is related to a specific device—in this case the main circuit monitor. But, since you've logged current values for all five circuit monitors, you'd probably define a Table w/Single Device, selecting per-phase and three-phase currents as your quantities. You could then use the defined Table w/Single Device to display a table or trend plot for any one of the five circuit monitors.

Defining a New Query or Table

To define a query or table, follow these steps:

1. On the Display menu, click Historical Data.
2. In the Historical Data dialog box, click Add.
   SMS displays the Add dialog box.



3. In the Type box, select the desired type of query or table.
4. In the Name box, type a descriptive name for the query or table.
5. Click Continue.
   The dialog box that appears next depends on the type of query or table you selected. If you selected a Table, the dialog box allows you to select a quantity (or quantities) only. If you selected a Query, the dialog box allows you to select a quantity (or quantities) and device (or devices).
6. Select the devices and/or quantities as required, then click Finish.
   SMS returns to the Historical Data dialog box. You can now use the newly defined query or table to display a history table or time trend plot.

Displaying a History Table or Time Trend Plot

Before you can display a history or time trend plot, you must have defined tables and/or queries as described in the previous section. You must also have logged the desired data to the SMS database. For example, if you have defined a query to display historical voltage values from a circuit monitor called Main 1, you must have already logged voltage values for Main 1. (See Chapter 9 for instructions on logging.)

To display a history table or time trend plot, follow these steps:

1. On the Display menu, click Historical Data.
   SMS displays the Historical Data dialog box.
2. In the Tables/Queries box, select the desired query or table.
3. The Available Range box shows the entire range of logged data for all devices available in the SMS database. If you want to limit the range of data displayed, enter the desired start and end dates and times in the Available Range box.
4. If you picked a Table in step 2, select the desired device (or devices) in the Devices Available box.
   Only devices for which you've logged data appear in the list.
5. In the Display box, click either Table or Trend plot.
6. Click OK.
   SMS displays the table or trend plot.

Chapter 11—Resetting Device Data

The Resets feature provides the capability to reset data for a device or group of devices. The resets available will vary, depending on the device type. You can perform a reset manually, using the instructions in this chapter, or as a scheduled task (see "Chapter 7—Using Tasks to Automate Processes").

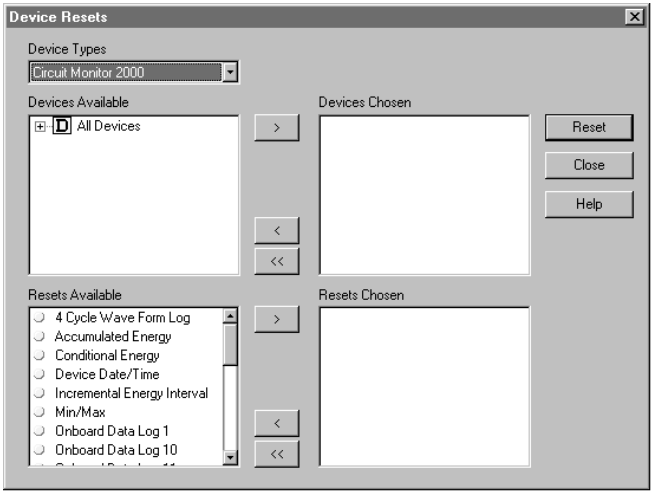
Note: *Resets are logged in the Event Log.*

The following table lists the available resets for each type of device.

Reset	Device Type							
	810D Trip Unit	CM 100	CM 2000	Digital Relay	Power Meter	Powerlink Panel	PIF-3	PIF-85
Accumulated Energy	X	X	X		X			
Device Date/Time	X	X	X	X	X	X	X	X
Min/Max	X	X	X	X				
Peak Demand Current	X	X	X	X	X			
Peak Demand Power	X	X	X		X			
4-Cycle Waveform Log		X	X					
Extended Waveform Log			X					
Energy Mgmt Level1		X						
Energy Mgmt Level2		X						
Energy Mgmt Level3		X						
Conditional Energy			X		X			
Incremental Energy Interval			X					
Onboard Data Logs (1–14)			X					
Trip Counters	X			X				

To reset device data, follow these steps:

1. On the Control menu, click Resets… .
   The Device Resets dialog box displays:



2. From the Device Types box, click the type of device you want to reset. Note that the resets that can be made are listed in the Resets Available box at the bottom left of the dialog box.

3. From the Devices Available list, click the specific device(s) that you want to reset. You can reset:
   - any set of individual devices (of the type selected in step 2)
   - any group of devices (of the type selected in step 2)
   - all devices (resetting all devices in the system that are the type selected in step 2)

   Click > or drag the devices to the Devices Chosen box.

4. From the Resets Available box, click the reset(s) you want to include.
   Click > or drag the devices to the Devices Chosen box.

5. Click Reset.
   The message Reset Operation(s) passed displays.

6. Click Close to return to the SMS main window.

Chapter 12—Working with Waveforms

POWERLOGIC circuit monitors have an optional waveform capture feature, which allows the circuit monitor to capture current and voltage waveforms and store the data in registers. SMS also provides data for troubleshooting harmonic problems, such as THD, telephone interference factor, and harmonic magnitudes.

SMS can:

- acquire new waveform plots from a circuit monitor and display them on your PC
- export waveform files to disk
- retrieve and display waveform files that are stored in onboard circuit monitor memory
- import and display waveform files that have been exported to disk (import option)
- retrieve and display device-specific waveform files that have been exported to disk (file option)

Acquiring a New Waveform

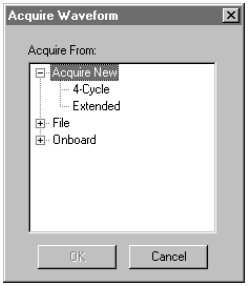
To acquire a new waveform plot and display it for viewing, follow these steps:

1. On the Display menu, click Waveform Plots… or click the Waveform toolbar icon . SMS displays the Waveform Source dialog box:

2. Select and click the circuit monitor from which you want view the waveform. Click OK.

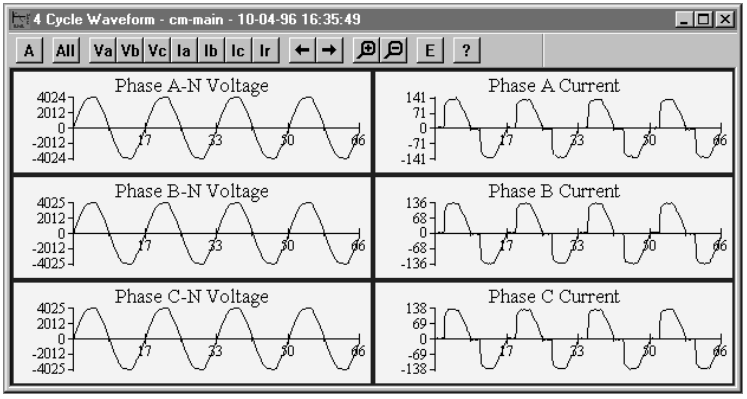
Acquiring a New Waveform (cont.)

The Acquire Waveform dialog box displays:



3. Click Acquire New, then click whether you want a 4-cycle or extended capture. (The size of the extended waveform—12, 24, 36, 48, or 60 cycles—is established in the Onboard Data Storage tab, when setting up a Series 2000 Circuit Monitor. The default is 12 cycles.)

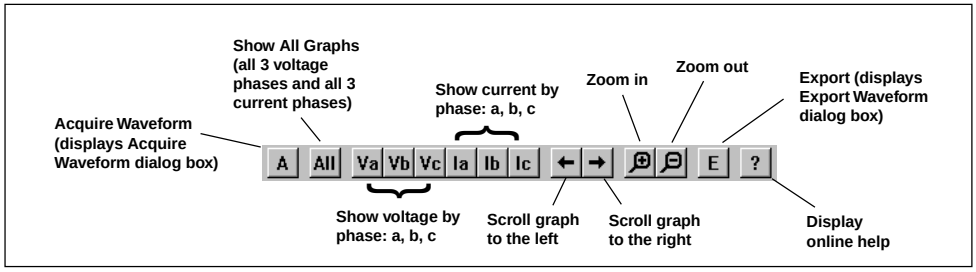
   Click OK. SMS captures the waveform data and then displays it. The figure below illustrates a 4-cycle waveform for the device named CM main.



Waveforms display with the date and time of capture (from the circuit monitor clock). To view additional information, or to export the waveform to a data file in your SMS network, see **Toolbar Buttons**, **Displaying a 4-Cycle Waveform Data Block**, and **Exporting the Waveform to Disk**, later in this chapter.

Toolbar Buttons

The toolbar at the top of the waveform window contains buttons that you can click to change the view, to acquire, and to export. The figure below illustrates these buttons.



For example, click All to display all voltage and current phases, click Va to display only phase A voltage. Click the magnifying glass buttons to zoom in and out of the waveform, alternately lengthening or shortening the x-axis of the waveform.

Copying the Waveform Plot or Data Block to Other Windows Programs

You can copy the waveform data block or waveform plots to the clipboard for export into other Windows programs.

Displaying a 4-Cycle Waveform Data Block

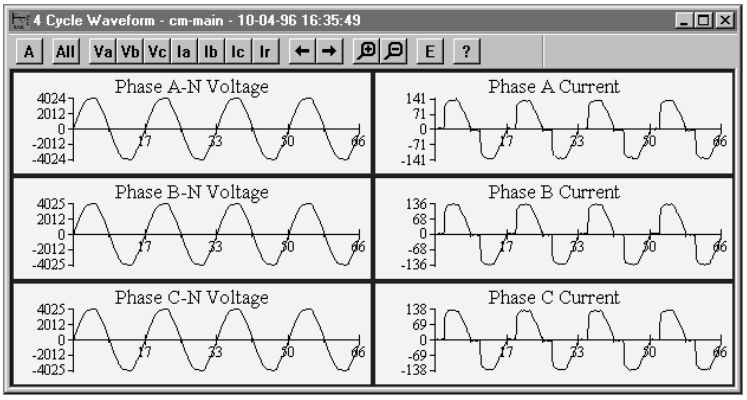
You can view a waveform data block for any 4-cycle waveform plot. The data block lists several items of data about that waveform (see the table later in this section for a description of this data).

To access a waveform, see **Acquiring a New Waveform** and **Retrieving a Stored Waveform File**, both in this chapter.

Displaying a 4-Cycle Waveform Data Block (cont.)

To display the waveform data block, complete the following steps:

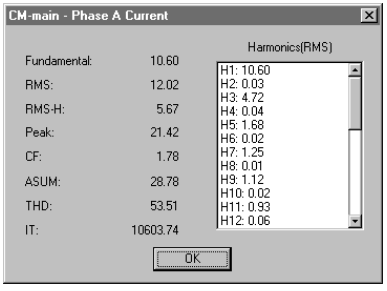
1. Acquire or retrieve a 4-cycle waveform plot.
   SMS displays the selected waveform plots.



2. Place the cursor on the title (**Phase A Current**, for example) of a single waveform plot.

3 Double-click the title of the single waveform plot.

SMS displays the waveform data block for the selected waveform plot (shown in the figure below). The waveform and the data block can be printed at this point. Separate printouts of each will print automatically.



The following table lists definitions of the data illustrated in the data block on the previous page.

Waveform Data Block

Fundamental	Fundamental Frequency Component Magnitude (60 Hz)—The rms magnitude or root-mean-square (rms) value of the fundamental component; the fundamental value for 60Hz systems is 60Hz.
RMS	RMS Magnitude—The magnitude of the waveform, including effects from the fundamental and harmonic components.
RMS-H	RMS Magnitude of Harmonic Components—The magnitude of the square-root of the sum-of-the-squares of the magnitudes of the individual harmonic components of the waveform.
Peak	Peak Magnitude—The largest value (absolute value) the waveform reaches in the acquired sample.
CF	Crest Factor—The peak magnitude of the waveform divided by the rms value of the waveform.
ASUM	Arithmetic Sum—The arithmetic sum of the magnitudes of the fundamental and individual harmonics as opposed to the vectorial sum.
THD	Total Harmonic Distortion (% of Fundamental)—The square-root of the sum-of-the-squares of the individual harmonic magnitudes divided by the magnitude of the fundamental.
IT	Telephone Interference Factor (I•T)—A calculated value which gives a measure of the power circuit's ability to cause interference with communications circuitry in proximity to the power circuit.
H1, H2,...H31	Fundamental (H1) Harmonic Magnitudes through the 31st

Exporting the Waveform File to Disk

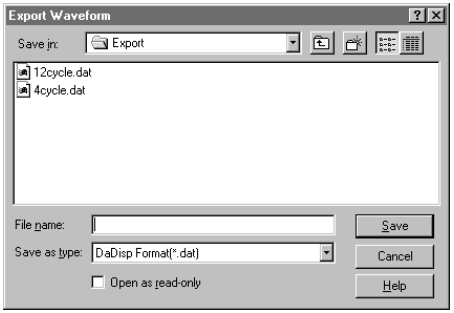
You can save any displayed waveform to a data file on your PC or on any other PC in your network. At a later time, you can retrieve the file for reference.

To save a waveform capture, storing it in an SMS data file, follow these steps:

1. Acquire a new waveform, following steps on the previous pages. (Or retrieve a previously captured waveform file that has been saved in on-board storage of a circuit monitor.)

Exporting the Waveform File to Disk (cont.)

2. Click E on the waveform toolbar. The Export Waveform dialog box displays:



3. The default directory, Export, is located in the SMS-3000 data file. To enable clients to easily access exported waveform files, we recommend that you export all waveform files to a common file on the server PC. See the note under **Retrieving a Stored Waveform** at the beginning of this chapter.

4. Type the file name you want to use for this waveform.

5. Choose the data type: .dat or .csv.

6. Click Save.

SMS exports a copy of the waveform file to the location you specified.

Retrieving a Stored Waveform File

Previously acquired waveforms can be stored on board the circuit monitor (see the waveform capture section in your circuit monitor instruction bulletin) or in system data files (see **Exporting the Waveform File to Disk**, earlier in this chapter).

Note: *When you export waveform files, SMS assumes a default destination directory of c:\sms-3000\export. If you accept this default, you will be able to retrieve these stored files only from the PC on which they are stored. Thus, we recommend that you store all waveforms on a common file on the server PC. This will ensure that all clients can retrieve all stored waveform files.*

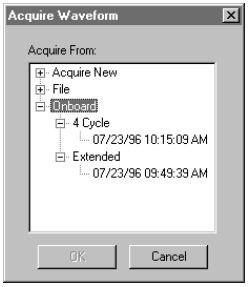
Also note that SMS saves waveforms, captured in automated tasks, in the Export file of SMS-3000 (on the server PC). Although these filenames will display when using the ***File*** *option, they are only accessible through the* ***Import*** *option.*

You can retrieve stored waveform files according to the following instructions.

Retrieving an On-Board Waveform File

To view a waveform that is stored on board the circuit monitor, follow these steps:

1. Following steps 1–2 on the previous pages, display the Acquire Waveform dialog box:



2. Click Onboard. SMS lists the waveforms that have been stored on board the circuit monitor. If both 4-cycle and extended waveforms are stored, they are listed separately, by the date and time of their capture.

3. Double-click the name of the waveform file that you want to view.

SMS displays the waveform file.

Importing a Stored Waveform File (Import Option)

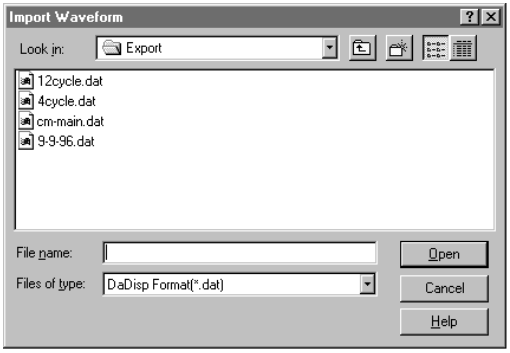
Note: *Be sure that all waveforms, from all client PCs, are exported to a common location on the server PC. This ensures that all clients will be able to retrieve all waveforms, regardless of the location from which they were acquired and stored. Waveforms that are stored on one client PC are not retrievable from other client PCs.*

To view a waveform that is stored in an SMS data system file, follow these steps:

1. On the Display menu, click Waveform Plots… or click the Waveform toolbar icon. SMS displays the Waveform Source dialog box.

2. Double-click Import Waveform.

SMS displays the Import Waveform dialog box:



3. Double-click the name of the waveform you want to view.

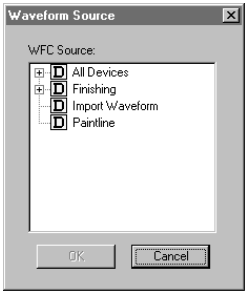
SMS displays the waveform.

Retrieving a Stored Waveform File (File Option)

Clients should not use this option because it does not provide a path for retrieving files from other computers. Clients should use the following option, **Importing a Stored Waveform File**.

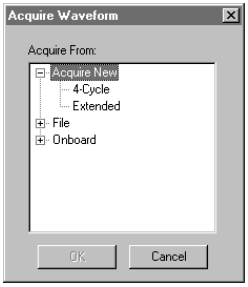
To retrieve a stored waveform file, follow these steps:

1. On the Display menu, click Waveform Plots… or click the Waveform toolbar icon  .
   SMS displays the Waveform Source dialog box.



2. Select the device from which you want to view a waveform file: open the group to which the device belongs. Then double-click the device name.

SMS displays the Acquire Waveform dialog box:



3. Click File.
   SMS displays the stored waveform files that you can view.
4. Double-click the name of the waveform file that you want to view.

SMS displays the file.

Chapter 13—Control Outputs

This chapter tells how to apply and operate control outputs using SMS; it does not tell how to configure circuit monitor relay outputs. See "Setting Up Relay Outputs" in Chapter 5 for instructions on configuring relay outputs.

Overview

Control outputs allow manually-initiated, password-protected control of the following:

- Relay outputs for Series 2000 Circuit Monitors (an additional add-on Input/Output Module must be mounted to the rear of the circuit monitor)
- Relay outputs for Series 100/200 Circuit Monitor models CM-144 and CM-244
- Bit control for a given register in a SY/MAX programmable logic controller (PLC) from Square D, or other SY/MAX-compatible device. In a PLC system, this bit is typically used in custom programmable logic to perform some other action.

Example Applications and Definitions of Terms

A *Manual Control Output* is a control output for:

- any series 2000 Circuit Monitor relay that is *not enabled* for on-board operation
- a CM-144 or CM-244 relay
- a SY/MAX PLC (or other SY/MAX-compatible device)
- Manual control output examples:
  - manually close and open circuit breakers (see example in Appendix D)
  - manually energize and de-energize contactors

An *Override Control Output* is a control output for a CM-2150 (or higher) relay that is *enabled* for on-board operation. See the next section "More About the Series 2000 Circuit Monitors" for more information.

Override Control Output example:

If you use "Over KW Demand Level 1" (Alarm Number 67 in Appendix C) to automatically energize relay R1, the R1 contact might be wired to an automatic transfer switch to start a generator, and transfer some load from utility power to your generator. Your motive for doing this may be to reduce peak demand charges from the utility, for example. (See Appendix D for more details on this example.)

Suppose that the generator in the example was scheduled to be out of commission for maintenance. During the maintenance period, you might not want relay R1 to energize, even if the "Over KW Demand Level 1" alarm were to occur. This is a situation in which an Override Control Output may be used to temporarily "freeze" R1 open during maintenance, then place R1 back into automatic operation when maintenance is complete. Also, if you wanted to test generator operation after completing the maintenance, you could temporarily force (override) R1 ON or OFF even though KW Demand is below the pickup setpoint at the time of the test.

More About the Series 2000 Circuit Monitors

For the Series 2000 Circuit Monitor relay outputs, it is important to understand the concepts of *on-board operation* and *overrides*.

Each Series 2000 Circuit Monitor relay output can be configured for onboard operation. The section "Setting Up Relay Outputs" in Chapter 5 tells how to set up relay outputs. Chapter 5 says that to configure a relay for onboard operation you must check the *Enable Onboard Operation* checkbox on the I/O module tab in the Series 2000 Circuit Monitor Device Setup dialog box.

If Enable Onboard Operation is *checked*—

The associated relay is controlled *automatically* by the circuit monitor (even if your computer is turned off), in response to onboard alarm conditions internal to the circuit monitor. (Appendix C lists the circuit monitor's on-board alarm conditions. The section "Setting Up On-board Alarms/Events" in Chapter 5 tells how to assign on-board alarm conditions to operate relays.) When a relay is configured for onboard operation, you cannot control the relay using SMS unless you first *override* the relay. When you override the relay, you temporarily take away the circuit monitor's ability to automatically operate the relay in response to on-board alarm conditions; the circuit monitor simply ignores the alarms conditions that would cause the relay to change state if it were not overridden. While a relay is overridden, you can operate it manually (force it On and Off) using SMS. It may help to think of overriding a relay as taking the relay out of "auto" mode and putting into "manual" mode. The relay stays in manual mode until you release the override using SMS.

If Enable Onboard Operation is *not checked*—

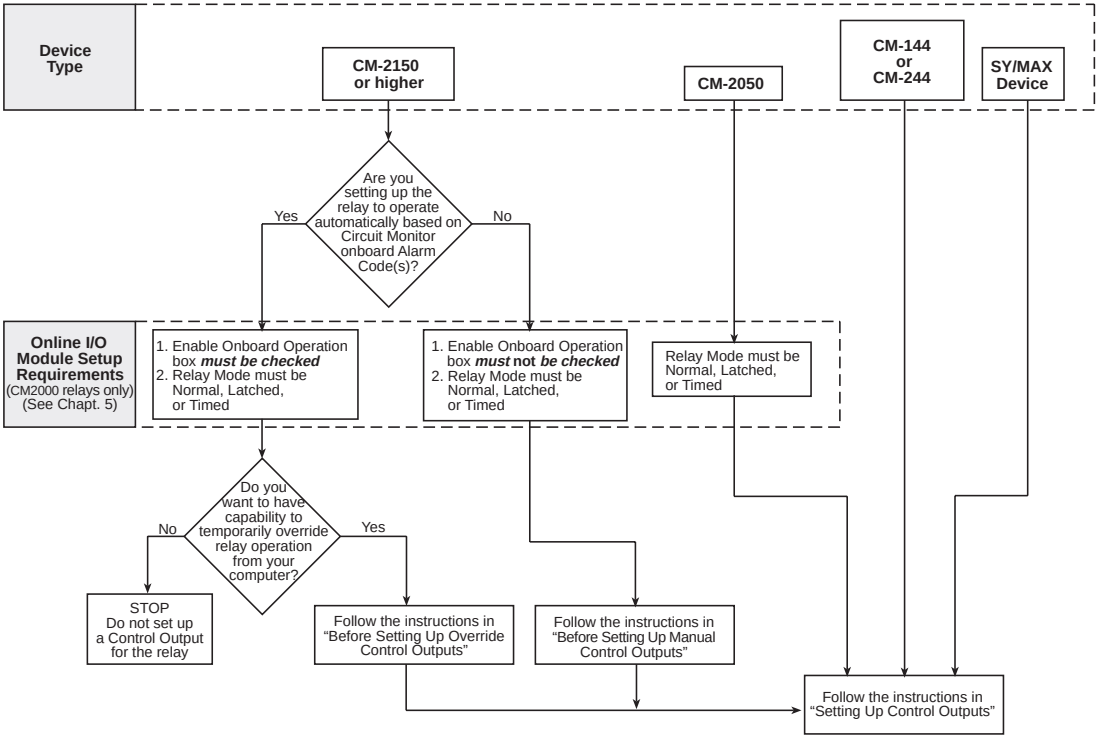
The associated relay is controlled by a source external to the circuit monitor via communications. This external source could be either a person using SMS to control outputs, or a SY/MAX programmable controller or other SY/MAX compatible device. "Override," as described in the previous paragraph, does not apply because the relay is not enabled for on-board operation. (In SMS, when you select a control output that is not enabled for onboard operation, the Override and Release buttons are grayed out.) When you receive a new Series 2000 Circuit Monitor and install an Input/Output Module on it, the default for all relays is *not enabled* for on-board operation.

Control Outputs Setup Flow Chart

Refer to the flow chart below for a representation of the setup requirements described in previous sections of this chapter.

The flow chart requires CM-2000 relays to be configured for normal, latched, or timed mode. Control outputs cannot function correctly if the controlled relay is operating in one of the seven pulse modes (such as "Absolute KWH Pulse") listed in the "Setting Up Relay Outputs" section in Chapter 5.

We recommend that you use relays R1, R2, and R3 for Series 2000 Circuit Monitor control outputs. The KYZ relay output is designed for the billions of operations required in the pulse modes. The KYZ relay can also be configured for normal, latched, or timed mode and used for a control output, but the low contact current rating of the KYZ relay makes it unsuitable for some control outputs applications.



Before Setting Up Manual Control Outputs

If you are defining a control output for a CM-144, CM-244, or SY/MAX PLC, go straight to the section "Setting Up Control Outputs."

If you are defining a manual control output for a Series 2000 Circuit Monitor, you must first perform the required I/O module setup as described in the control outputs setup flowchart and summarized below.

For a CM-2050 you must,

- Select a mode (normal, latched, or timed) for the relay

For a CM-2150 or higher, you must do two things:

- Select a mode (normal, latched, or timed) for the relay
- Verify that the Enable Onboard Operation checkbox on the I/O module tab in the CM-2000 Device Setup dialog box is ***not*** checked

If you have not previously completed these setup tasks, see "Setting Up Relay Outputs" in Chapter 5 for instructions. After you've completed the required I/O module setup, follow the instructions in the section "Setting Up Control Outputs" in this chapter to define control outputs.

Before Setting Up Override Control Outputs

Before you can define an override control output for a CM-2150 or higher, you must follow these steps:

- Select a mode (normal, latched, or timed) for the relay
- Verify that the Enable Onboard Operation checkbox on the I/O module tab in the CM-2000 Device Setup dialog box ***is*** checked
- Set up the desired alarm conditions to operate the relay output

If you have not previously completed these setup tasks, see "Setting Up Relay Outputs" in Chapter 5 for instructions on completing the first two tasks in the list above. See "Setting Up Onboard Alarm/Events" in Chapter 5 for instructions on completing the third task.

In addition to the required setup tasks described above, we recommend that you define two digital functions for the relay—one for relay on/off status and one for relay override status. By defining these digital functions and setting them to log state changes and generate alarms, you'll ensure comprehensive system event logging and alarming.

Digital Functions for Relay On/Off Status:

Note: For the four following digital functions, choose an alarm level that is not *set up for visual, acknowledge, or audible. Factory default level 9 is appropriate.*

Function Name:	KYZ Status
Quantity:	KYZ Relay Status
Equal Condition Name:	On
Non-Equal Condition Name:	Off
Alarm:	Yes

Function Name:	R1 Status
Quantity:	R1 Relay Status
Equal Condition Name:	On
Non-Equal Condition Name:	Off
Alarm:	Yes

Function Name:	R2 Status
Quantity:	R2 Relay Status
Equal Condition Name:	On
Non-Equal Condition Name:	Off
Alarm:	Yes

Function Name:	R3 Status
Quantity:	R3 Relay Status
Equal Condition Name:	On
Non-Equal Condition Name:	Off
Alarm:	Yes

Digital Functions for Relay Override Status:

Note: For the four following override digital functions, choose an alarm level that is set up for visual indication and requires user acknowledgment.

Function Name:	KYZ Override Status
Quantity:	KYZ Relay Override State
Equal Condition Name:	Overridden
Non-Equal Condition Name:	Not Overridden
Alarm:	Yes

Function Name:	R1 Override Status
Quantity:	R1 Relay Override State
Equal Condition Name:	Overridden
Non-Equal Condition Name:	Not Overridden
Alarm:	Yes

Function Name:	R2 Override Status
Quantity:	R2 Relay Override State
Equal Condition Name:	Overridden
Non-Equal Condition Name:	Not Overridden
Alarm:	Yes

Function Name:	R3 Override Status
Quantity:	R3 Relay Override State
Equal Condition Name:	Overridden
Non-Equal Condition Name:	Not Overridden
Alarm:	Yes

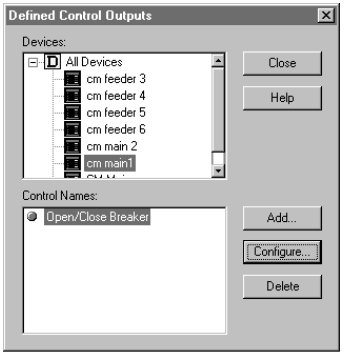
After you've completed the required setup, follow the instructions in the section "Setting Up Control Outputs" below to define control outputs.

Setting Up Control Outputs

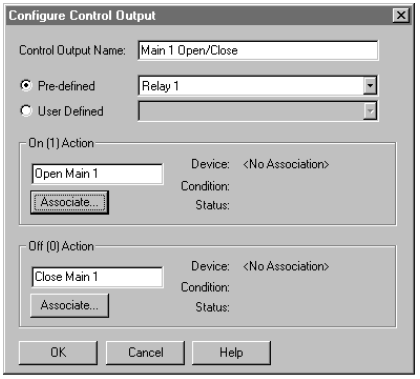
It may be helpful for you to read "Appendix D—Control Output Examples" before setting up control outputs.

To define a new control output, follow these steps:

1. On the File menu, click Open>System, then select the system to edit.
2. On the Setup menu, click Control Outputs.
   SMS displays the Defined Control Outputs dialog box, shown below.



3. In the Devices box, select the desired device.
   The Control Names box updates to show any previously defined control outputs for the selected device.
4. Click the Add pushbutton.
   SMS displays the Add Control Output dialog box.



5. In the Control Output Name box, type a descriptive name.

   For example, if the control output will be used to turn a chiller fan On and Off, you might name the control output "Chiller Fan 1."

6. If you are defining a control output for a circuit monitor relay, click the Pre-defined option button, then select the relay to control from the drop down list box.

   For the CM-2000, relays R1, R2, and R3 are recommended for control outputs. The KYZ relay can also be used, but the KYZ relay has a low current rating since it is designed for pulse applications.

7. If the control output is for a SY/MAX device or a circuit monitor output other than a relay, click the User-Defined option button, then select the digital function to control from the drop down
   list box. User-defined control outputs require that you define a custom quantity that is set up as digital and writable. See Chapter 16 for instructions on defining custom quantities.

8. In the On (1) Action and Off (0) Action boxes, type names that describes the On and Off actions.

   For the "Chiller Fan 1" example in step 5, you might enter "Fan On" and "Fan Off" for the On (1) and Off (0) actions, respectively. If the control output were to control a contactor, the condition names might be "Energize" and "De-energize."

9. If you want to associate an input with the control output, click the Associate button and follow the instructions in the next section.

   The Associate function lets you verify the success or failure of a control output operation by associating an input with a control output. For example, you could associate a control output to close a circuit breaker with the operation of the circuit breaker auxiliary switch via a digital function.

10. After completing any desired associations, click OK.

    The new control name appears in the Control Names list box.

Associating an Input with a Control Output

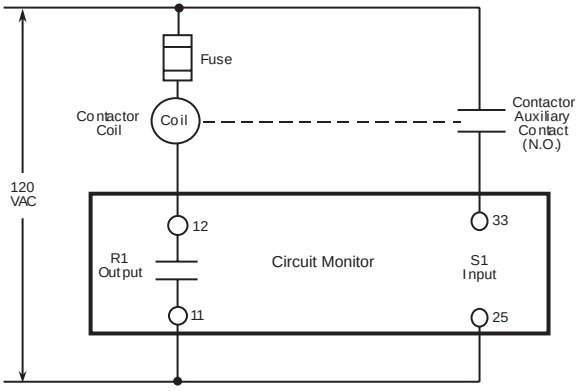
Power equipment applications often require external feedback from control circuitry to verify not only that the control command was successfully communicated to the device, but also that the desired result was actually achieved.

Note: *We strongly recommend that you create associations for each POWERLINK circuit breaker control output that you define. The association ensures that you will be properly notified of the success or failure of a control attempt.*

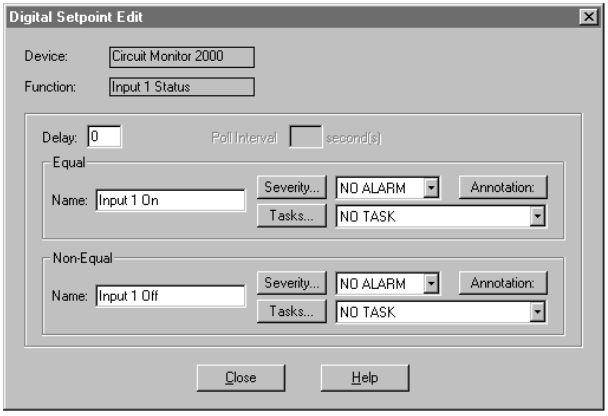
Using SMS, you can associate the response of a discrete input with a control output operation. In other words, you can wire contact feedback to a circuit monitor input or SY/MAX digital input and monitor for change in state as a result of the control action. Success or failure of the operation is then based on whether the input achieves the desired state after a user-defined time delay.

The figure below is a simple example in which the Associate function would be useful. The figure shows a circuit monitor with optional inputs and outputs. One of the circuit monitor's control outputs is used to activate a coil that closes a contactor. The contactor is then wired to one of the circuit monitor's inputs.

In the example, when output R1 is *Off*, S1 should be *Off* ("Open"). When output R1 is *On*, the contactor coil should pick up, thereby closing the contactor auxiliary contact; input S1 should therefore be *On* ("Closed"). If the contactor fuse was blown, a wire was loose, the contactor coil failed, or some other malfunction occurred, the SMS Associate function would inform the operator that the desired result was not achieved—even though the R1 contact may have operated properly.



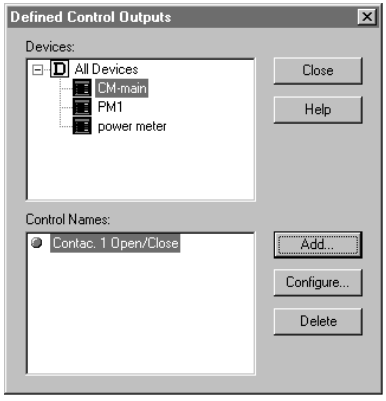
Before you can create an association to a control output, you must define a digital function. In order to associate a control output with the status of circuit monitor input S1, as shown in the example above, you would have to define a digital function based on the pre-defined digital quantity *Input 1 Status*. The Digital Setpoint Edit dialog box on the next page shows the digital function definition for our example.



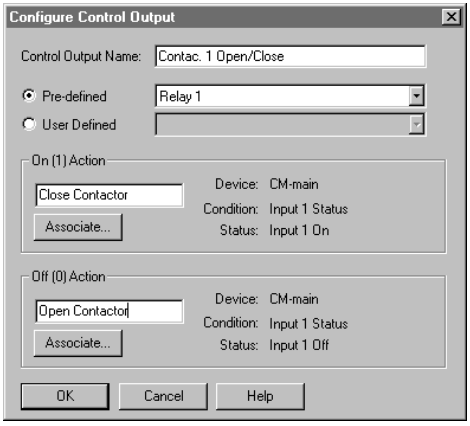
The procedure that follows tells how to create an association. It uses the illustration above as an example. For the example, assume that we have already create a control output called Contactor 1 Open/Close that is used to operate relay R1, and that we have defined a digital function called Input 1 Status as shown in the dialog box above.

To associate an input with a control output, follow these steps:

1. On the File menu, click Open>System and select a system to edit.
2. On the Setup menu, click Control Outputs.
   SMS displays the Defined Control Outputs dialog box.

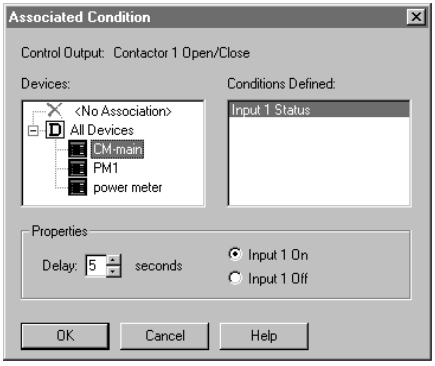


6. In the Devices box, select the desired device.
7. In the Control Names box, select the control output for which you will create an association.
   For our example, we selected the control output called Contac. 1 Open/Close.
8. Click Configure...
   SMS displays the Configure Control Output dialog box.



9. In the On (1) Action box, click the Associate… button.

   SMS displays the Associated Condition dialog box.



10. In the Devices box, select a device.

    SMS updates the Conditions Defined box to show all digital functions that you've assigned to the selected device.

11. In the Conditions Defined box, select the desired digital function.

    When you select a function, option buttons appear in the Properties box. The option buttons correspond to the names you defined for the Equal and Non-Equal conditions in the Digital Function Setpoint Edit dialog box.

12. In the Properties box, enter the appropriate time delay (from 5 to 60 seconds).

    Be sure that the time delay you enter is long enough to ensure a state change. If the time delay is not long enough, the message SMS displays indicating success or failure could be incorrect. Be sure that your equipment responds in the time you specify and allow two seconds or more for communicating to the device for verification.

13. In the Properties box, select the option button for the condition that you want to associate with the On (1) Action.

    In the Associated Condition dialog box above, we have selected the Input 1 On option button. We did this because, in our example, when relay R1 is On, input S1 should be On.

14. Click OK. SMS returns to the Configure Control Output dialog box.

15. In the Off (0) Action box, click the Associate… button.

16 Repeat steps 10–14 to create an association with the Off (0) Action, except at step 13 select the option button for the condition that you want to associate with the Off (0) Action. (For our example, we would select the Input 1 Off option button.)

Executing Manual Control Outputs

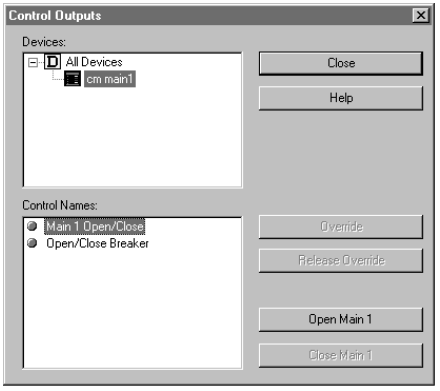
SMS must be online to execute control outputs. You execute a control output using the Control Outputs command on the Control menu. If you are using the Interactive Graphics Interface (GFX-700), you can also execute a control output using a control block. For instructions on executing control outputs from a diagram, refer to the *Interactive Graphics Interface* instruction bulletin.

To execute a manual control output, follow these steps:

1. If SMS is not online to your system, click the Online>System command on the File menu to go online.

2. On the Control menu, click Control Outputs.

   SMS displays the Control Outputs dialog box.



3. In the Devices box, select the desired device.

   The Control Names box updates to show all control outputs defined for the device.

4. In the Control Names box, select a control output to execute.

   Note: *The Override and Release buttons are grayed out if you selected a manual control output. If the Override and Release buttons are not grayed out, you are operating a CM-2000 relay that is enabled for on-board operation. If you do not understand why the relay is enabled for on-board operation, click the Close button at the top of the dialog box and review the preceding sections of this chapter.*

5. Click the button to the right of the Control Names box that corresponds to the action you desire. Enter your Username and Password, then click OK.

   SMS displays a message telling you whether the control action has succeeded or failed.

6. Click OK to acknowledge the action.

   SMS records the control action in the event log.

Executing an Override Control Output

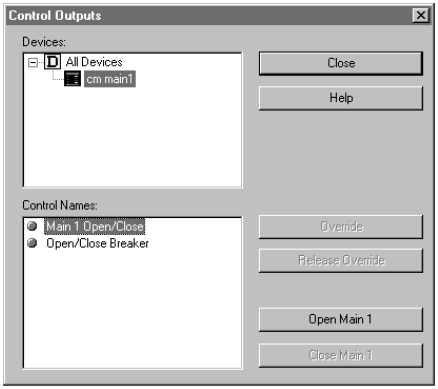
SMS must be online to execute control outputs. You execute a control output using the Control Outputs command on the Control menu. If you are using the Interactive Graphics Interface (GFX-700), you can also execute a control output using a control block. For instructions on executing control outputs from a diagram, refer to the *Interactive Graphics Interface* instruction bulletin.

To execute an override control output, follow these steps:

1. If SMS is not online to your system, click the Online>System command on the File menu to go online. Then set the sampling mode to Scheduled Update.

2. On the Control menu, click Control Outputs.

   SMS displays the Control Outputs dialog box.



3. In the Devices box, select the desired device.

   The Control Names box shows all control outputs defined for the selected device.

4. In the Control Names box, select a control output to execute.

5. Click a button corresponding to your intent, based on the table below. SMS displays the security box. Enter your username and password, then click OK.

   Override can be thought of as taking the relay out of *auto operation mode* and putting it into *manual operation mode.* After you have placed a relay in Override, you can force it *On* and *Off* using the On Action and Off Action buttons. While in override, the relay will not respond to automatic control requests based on the circuit monitor's on-board alarm conditions; the relay stays in its current state until you force it into the opposite state.

   The relay stays in Override until you click the Release Override button to place it back into auto mode. Once you've released the relay, it will again respond to automatic control requests based on the circuit monitor's on-board alarm conditions.

   Note: *When you release an overridden relay, the relay may unintentionally operate. For example, if the relay is overridden off and you click Release while a controlling alarm condition is true, the relay energizes.*

6. Click OK to acknowledge the action.

   SMS records the control action in the event log.

Override Button	Available	Grayed	Grayed	Grayed	Grayed
Release Override Button	Grayed	Available	Available	Grayed	Grayed
ON Action Button ¿	Grayed	Available	Grayed	Available	Grayed
OFF Action Button ¿	Grayed	Grayed	Available	Grayed	Available
Relay Status	**Relay is not presently overridden. On-board CM2000 control is in effect.**	**Relay is presently overridden. Relay is OFF.**	**Relay is presently overridden. Relay is ON.**	**Relay is not enabled for on-board operation. Relay is OFF. ¡**	**Relay is not enabled for on-board operation Relay is ON. ¡**

¿ The text that appears on the ON Action and OFF Action buttons depends on the names you assigned to the output actions when defining the control output. The OFF Action button is the bottom button in the dialog box. The ON Action button is immediately above it.

¡ If the Override and Release buttons are both grayed out, then you have selected a *manual* control output. You cannot override the relay; you can only turn it ON and OFF.

Chapter 14—Reports

SMS allows you to create and print custom data reports. You can print reports manually, and you can schedule reports to print automatically, at a user-defined interval. For example, you might create a report that includes energy usage for the past month, then schedule it to print monthly.

The following are important points about the report feature:

- Report definitions are specific to the client software and PC you used to define them. For example, assume that you've installed SMS client software on three PCs in your facility, including the plant engineer's PC. If you define reports using the SMS client software installed on the plant engineer's PC, the following things are true:

  – The report definitions are stored on the plant engineer's PC

  – You can only view or edit the report definitions using the SMS client installed on the plant engineer's PC

  – Any scheduled reports that you define using the plant engineer's PC will print automatically *only if* the SMS client on the plant engineer's PC is running. If the SMS client on the plant engineer's PC is not running at the time a report is scheduled to print, the report will not print; the next time you start the SMS client, the report will print immediately.

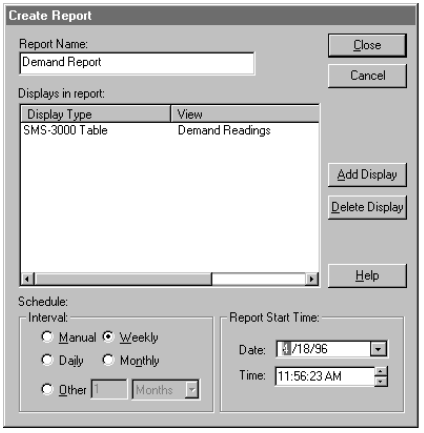
- When SMS automatically prints a scheduled report that contains historical data (for example, historical data tables), the report includes historical data from present to the last time the scheduled report printed. For example, if the report were printed a month ago, SMS would print only the last month's data (even if the SMS database contained many months of historical data).

Creating a Report and Scheduling It for Automatic Printing

To create a report, follow these steps:

1. On the Reports menu, click Schedule/Print.
   SMS displays the Report dialog box.

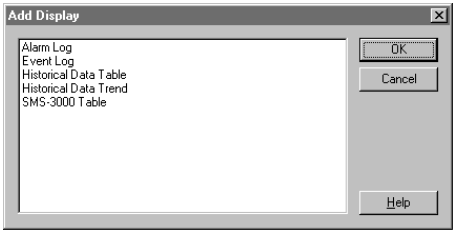
2. Click Add.
   SMS displays the Create Report dialog box.



3. In the Report Name box, type a name for the new report.

4. At this point, you must select the information to be included in the report. You do this by adding displays. To add a display, click Add Display.

   SMS displays the Add Display dialog box.



5. Select the desired display, then click OK.

6. What happens next depends on the type of display you select.

   • If you select the Alarm Log or Event Log, SMS returns to the Create Report dialog box and adds your selection to the list of displays in the report.

   • If you select Historical Data Table or Historical Trend Plot, SMS displays the Historical Data dialog box. Select the desired query or table from the Tables/Queries box. If you select a table, select the device(s) then click OK.

   • If you select SMS-3000 Table, SMS displays the Open Table Display dialog box. Select the desired SMS-3000 table and device(s), then click OK.

7. Repeat steps 4–6 to add additional displays to your report.

8. In the Schedule Interval box, select how often you want the report to print.

   If you *do not* want the report to print automatically at a regular interval, select the Manual option button. If you select Manual, you'll need to manually print the report when you want it. See the next section, "Manually Printing a Report" for instructions.

9. In the Report Start Time box, enter the date and time on which the report will first print.

   For example, if you selected the Monthly option button and entered the date 6/1/96 and time 5:00 PM in the Report Start Time box, the report would print first on 6/1/96 at 5:00 PM. The report would then print on the first day of each month at 5:00 PM.

10. Click Close when you're done creating the report.

    SMS returns to the Report dialog box. Repeat steps 2–10 to create additional reports.

Manually Printing a Report

To manually print a report, follow these steps:

1. On the SMS menu bar, click Reports.

   SMS displays the Report dialog box.

2. Select a report from the list of defined reports, then click Print.

Even if you've scheduled a report to print automatically, you can still print it manually. For example, you might schedule a report to print at the first of each month, then decide you'd like a mid-month printout. Simply print the scheduled report manually as described above. If the report contains historical data, SMS includes historical data from the last time the report printed automatically to present. When you manually print a report that *is not* scheduled for automatic printing, SMS prints the data from the last time the you manually printed the report to present.

Chapter 15—Getting Data To and From Other Places

This chapter describes ways to get SMS data to and from other places using the clipboard, printing, and saving to a file.

Copying Waveforms Using the Clipboard

The clipboard is a standard feature of virtually all Windows applications. The clipboard allows you to copy waveforms and paste them into other Windows applications that support the clipboard format.

To use the clipboard, follow these steps:

1. Display the waveform to be copied.
2. Click in the waveform window to make it the active window.
3. On the Edit menu, click Copy.
4. Switch to the destination document, and click Paste on the Edit menu.

   You may need to place an insertion point before you click Paste. For specific instructions on pasting into a particular application program, refer to the instruction material for the application program.

Clearing the Clipboard

To clear the clipboard, click Clear on the Edit menu. This clears unwanted information from memory.

Printing

The SMS print feature allows you to print data displayed in open document windows. Any data that you can display in an SMS document window can be printed. This includes tables, bar charts, meters, time trends, waveform plots, and so on.

Preparing to Print

Before you can print, you must set up the target printer. The Windows control program handles the interface to different types of printers. This section offers basic instructions for printer setup. For detailed instructions on printer setup, refer to your Windows documentation.

To set up the target printer, follow these steps:

1. On the File menu, click Printer Setup.
   SMS displays the Printer Setup dialog box.
2. From the Available Printers list, select the desired printer.
3. To change a printer's setup, click the Setup button and edit the values in the dialog box to meet your needs.
   Click the Help button for more on setting up printers.
4. Click OK.

Printing a Window

If you want to print the contents of the active window, use the Print command.

To print the active window, follow these steps:

1. Click inside the window to make it active.
2. On the File menu, click Print.
3. Enter the desired settings in the Print dialog box and click OK.

Saving Data from Tables and Trend Plots to a File

To save data from an instantaneous data table, history table, or trend plot to a file on your PC's hard disk, follow these steps:

1. Display the table or trend plot.
2. Move the pointer over the table or trend plot, then double-click using the right mouse button.
   SMS starts Formula One, the tool used to create tables and trend plots.
3. On the Formula One File menu, click Write.
   Formula One displays the Write File dialog box.
4. In the Write File dialog box, choose a location, enter a filename, and select a Save As Type. Then click Save.
   Formula One saves the data to a file in the selected format.

Chapter 16—Customizing the Software

Setting Up Groups

To make it easier to select devices, SMS lets you define groups. A group is a number of devices that have something in common; for example:

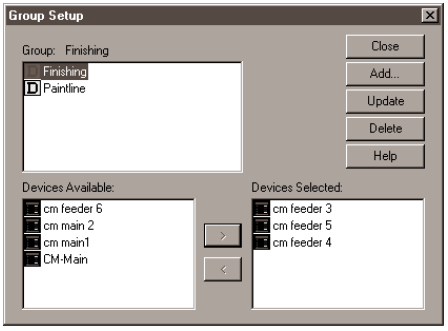
- devices that have a common voltage, such as feeders
- devices that are grouped for billing purposes, such as individual departments

For example, you might create a group consisting of all devices in Substation 1, or all devices on the paint line, or all devices in building 1. Then, when you need to select a specific device from a list box, you can shorten the list of devices by selecting only the needed groups. A device can belong to more than one group.

Adding a Group

To add a group, follow these steps:

1. On the Setup menu, click Groups…. to display the Group Setup dialog box.



2. Click Add to display the Add Group dialog box. Enter the name of the group you are adding, then click OK to return to the Group Setup dialog box.

3. In the Devices Available menu, click the devices to be included in the group and drag them to the Devices Selected box, then click Update.

4. Click Close.

Saving a Workspace

A *workspace* is a picture of the following things:

- The data update mode (manual, scheduled, or continuous)
- The type and position of open document windows (tables, charts, and so on)

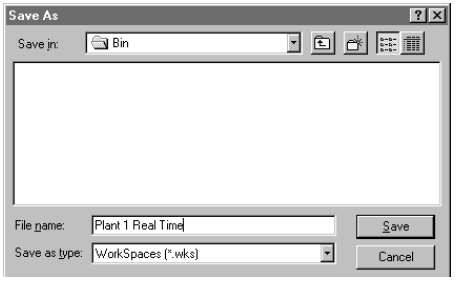
When you save a workspace, SMS stores the above information in a workspace file on the hard disk of the client PC. Then, when you open the workspace at a later date, SMS automatically restores the workspace. That is, the windows that were open when you saved the workspace are reopened, and the data update mode is restored. For example, let's say that the following conditions were true:

- SMS was in scheduled update mode with a 5-second update interval
- You were viewing a table of instantaneous current data for Feeder 1

You could then save the workspace, exit SMS, reenter SMS, and open the workspace. SMS would automatically display the table of instantaneous current data for Feeder 1, and begin taking data samples at 5-second intervals.

To save a workspace, follow these steps:

1. On the File menu click Save Workspace As.
   SMS displays the Save As dialog box.



2. Type a name for the workspace.
   Be sure to use the file extension .WKS.
3. Click Save.

To open a workspace, follow these steps:

1. On the File menu click Open>Workspace, or click  on the toolbar.
   SMS displays the Open dialog box.
2. Select the workspace to open.
3. Click Open.

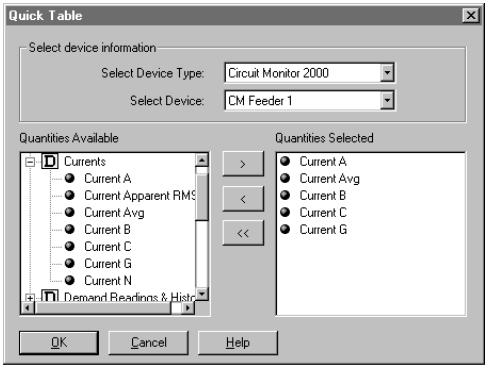
Creating Custom Tables

SMS provides a wide variety of pre-defined tables. In addition, SMS allows you to define custom tables. There are two ways you can create custom tables:

- You can use the New>Quick Table command on the File menu to create a table with multiple quantities from a singe device. You can then use the Save As command to save the table. After you've saved the table you can display it using the Tables command on the Display menu.
- You can use the New>Table command on the File menu to start the table editing program, SMSTable.exe, included with SMS. The SMSTable.exe program allows greater flexibility in how you create tables. You can also use the program to customize SMS's pre-defined tables. Because the SMSTable.exe program is a third-party tool, it is not documented in the SMS instruction bulletins. However, instruction bulletins from the software developer are available to you, free of charge. To receive a single set of the user's guides, fill out the Custom Table Setup Instruction Bulletins Request Form included in your SMS package and fax or mail it to us.

To create and save a quick table, follow these steps:

1. On the File menu, click New>Quick Table.
   SMS displays the Quick Table dialog box.



2. In the Select Device Type box, select the type of device.
3. In the Select Device box, select the desired device.
4. In the Quantities Available box, click the quantities to include in the table, and drag them to the Quantities Selected box.
5. Click OK.
   SMS displays a table with the selected quantities.
6. To save the table, click Save As on the File menu.
   SMS displays the Save As dialog box.

7. Enter a name for the table and click OK.

   Once you have saved your quick table, you can display it like any other standard SMS table. On the Display menu, click Tables. Your table appears in the list of available tables in the Open Table Display dialog box.

Defining Custom Quantities

For each supported device type, SMS provides a list of standard quantities. SMS lets you extend the list of quantities for a device type by defining *custom* quantities. You might need to define custom quantities when:

- You have a new PowerLogic compatible product
- You've create custom register values in a model CM-2450 circuit monitor
- You want to display individual harmonics from circuit monitor models CM2350 & up
- You want to use DDE to import data from another software package such as Excel

Once you've defined a custom quantity, it appears in the Quantities list boxes in SMS dialog boxes along with the standard quantities. You can log the quantity, alarm upon it, and use it in custom tables and interactive graphics diagrams. In short, you can use the custom quantity as you would use a standard quantity of the same type.

To define a new custom quantity, follow these steps:

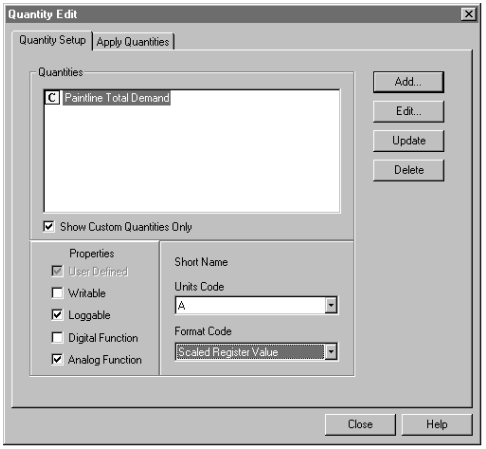
1. Using the Open>System command on the File menu, open the system to edit.

2. On the Setup menu, click Custom Quantities.

   SMS displays the Quantity Edit dialog box. The dialog box has two tabs. You'll use the Quantity Setup tab to define custom quantities, and the Apply Quantities tab to assign custom quantities to specific device types.

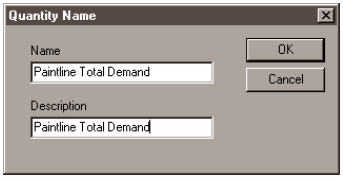
3. Click the Quantity Setup tab.

   Any custom quantities that you've previously defined appear in the Quantities list. If you've not previously defined any custom quantities, the Quantities list is empty. If you uncheck the Show Custom Quantities Only check box, SMS displays the standard quantities (preceded by an S) along with the custom quantities (preceded by a C). You cannot edit predefined quantities, but you can select them to view their register numbers, units, and format.



4. On the Quantity Setup tab, click Add.

   SMS displays the Quantity Name dialog box.



5. Enter a name and description for the new quantity, then click OK.

   The *description* appears in the Quantities list on the Quantity Setup tab. The description also appears in other quantities list boxes throughout SMS. The *name* is used when creating DDE links and when displaying data from onboard data logs.

6. Check the desired Properties and select a Units Code and Format Code as described in the Quantity Setup table on the next page.

7. Click Update to save the new quantity's definition.

   After you've defined new custom quantities, you will need to assign them to specific device types. This procedure is described on the next page.

Custom Quantity Setup Table

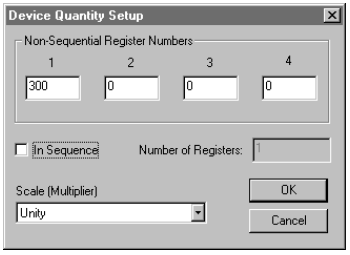
At this field…	Do this…
User Defined	SMS checks this box if the selected quantity is user-defined (custom). If the selected quantity is not custom, this box is not checked.
Writeable	Check this box if you want to be able to write to the custom quantity's register to change its contents—for example, if you are creating a digital custom quantity that will be used to define a control output.
Loggable	Check this box if you want to be able to log the quantity. If the box is checked, the quantity appears in the dialog box used to define history log templates.
Digital Function	Check this box if you are defining a custom quantity that will be used to define digital functions. If the box is checked, the quantity appears in the dialog box used to define digital functions.
Analog Function	Check this box if you are defining a custom quantity that will be used to define analog functions. If the box is checked, the quantity appears in the dialog box used to define analog functions.
Units Code	Select the appropriate units code for the quantity.
Format Code	Select the appropriate format code for the quantity.

To assign custom quantities to a specific device type, follow these steps:

1. Using the Open>System command on the File menu, open the desired system.
2. On the Setup menu, click Custom Quantities.
3. Click the Apply Quantities tab.
4. In the Device Type box, select the device type to which you will assign custom quantities.

   SMS lists the available custom quantities in the Available User Defined Quantities box. To list both custom and standard quantities, uncheck the Show Custom Quantities Only check box.
5. In the Available User Defined Quantities box, select the desired custom quantity and drag it to the Device Supported Quantities box (or use the > button).

   SMS displays the Device Quantity Setup dialog box. In this dialog box, you must specify the register (or registers) that the custom quantity is stored in.



6. If the custom quantity uses multiple registers, and the registers are in sequence, enter the first register number in the register 1 box. Then check the In Sequence check box and enter the number of registers used in the Number of Register box.

   For example, if the custom quantity is a 3 register date/time, and it is stored in device registers 150, 151, and 152, you would enter 150 in the box for register 1, check the In Sequence check box, and enter 3 in the Number of Registers box.

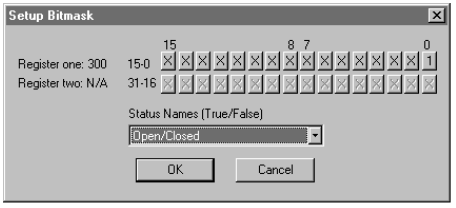
7. If the custom quantity uses multiple registers, and the registers are not in sequence, enter the register numbers in the Non-Sequential Register Numbers boxes.

   For example, if the custom quantity is a 3 register date/time, and it is stored in device registers 150, 155, and 156, you would enter 150 in the box for register 1, 155 in the box for register 2, and 156 in the box for register 3.

8. If, when you defined the custom quantity, you chose the Scaled Register Value format, select a scale multiplier from the Scale (Multiplier) box.

9. Click OK.

   If the custom quantity is a digital function format, SMS displays the Setup Bitmask dialog box. Complete the rest of this procedure. If the custom quantity is not a digital function, skip to step 13.



Note: *Steps 10-12 apply only if the custom quantity is a digital function format quantity.*

10. In the Status Names box, select the pair of status names that accurately describes the purpose of the custom quantity.

    For example, if the quantity will be used to define a digital function for fan status, you would probably select On/Off; for circuit breaker status you would select Open/Closed.

11. Click the desired bits in the bitmask until they are set to 1 or 0 as required. Leave an X for any unused bits.

    When you set these bits, you are defining the bit pattern that coincides with the True status. In other words, when the bits in the specified register exactly match the bitmask you define here, the status is True (this is equivalent to the Equal condition being true in the Digital Function Setpoint Edit dialog box). When one or more bits in the device register, excluding the bits you set to X in your bitmask, do not match the bits in your bitmask, the status is False (this is equivalent to the Non-Equal condition being true in the Digital Function Setpoint Edit dialog box).

12. Click OK.

    SMS returns to the Apply Quantities tab.

13. If SMS is online, take it offline by clicking the Offline command on the File menu. Exit the SMS client software, then shut down the POWERLOGIC Network Server. Restart the POWERLOGIC Network Server. Restart the SMS client software, and put your system back online. You can now use the newly defined custom quantities.

    ***Note**: You must do this last step each time you create a new custom quantity or edit an existing custom quantity, otherwise your changes will not take effect.*

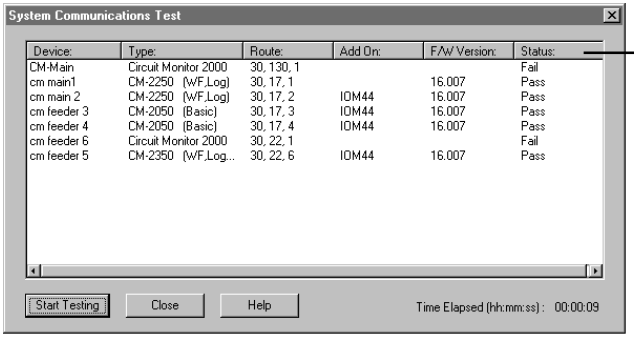
Chapter 17—Diagnostics

Performing a System Communications Test

To verify that SMS is communicating to devices, you can perform a system communications test. The system communications test forces SMS to attempt to communicate to each device in the online system, then returns the status of each device.

To perform a system communications test, follow these steps:

1. On the Control menu, click Diagnostics>System Communications Test.
   SMS displays the System Communications Test dialog box.



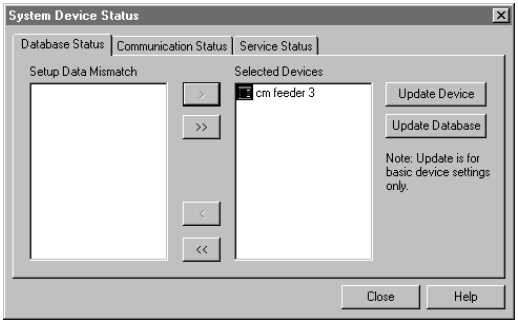
2. To start the test, click Start Testing.

   If you have a large system, testing may take several minutes. To pause a test in progress, click Pause.

   As SMS tests each device, it lists the device and its status.

System Device Status

SMS automatically displays the System Device Status dialog box when SMS detects, while going online, that the basic configuration data stored in the device does not match the basic configuration data stored in the SMS database.

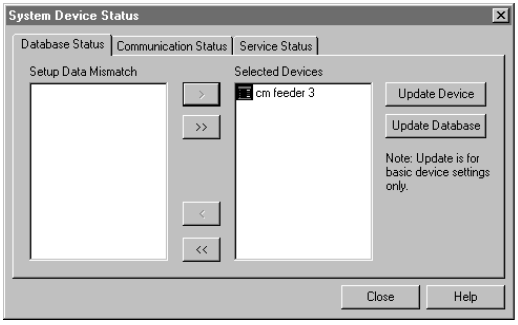


The System Device Status dialog box has three tabs used to perform three functions:

- Database Status tab—This tab lists the devices whose basic configuration data do not match the configuration data stored in the SMS database; it lets you synchronize the devices and database. The section "Correcting Mismatches in Device Setup Data" tells how. (This tab only appears when you are placing a system online and SMS detects that the basic configuration data stored in the device does not match the basic configuration data stored in the SMS database.)
- Communication Status tab—This tab lists the devices that have lost communication; it lets you attempt to reestablish communication with devices. The section "Reestablishing Communication with Devices" tells how(This tab is only available when the system is online.)
- Service Status tab—This tab lists the devices that are in service, and it lets you place devices out of service. The section "Placing Devices In and Out of Service" tells how.

Correcting Mismatches in Device Setup Data

When you place a system online, SMS compares the basic device setup information (for example, device address, baud rate, CT and PT ratios) stored in each device with the basic device setup information stored in the SMS database on your computer's hard disk. If SMS sees that the information in any device does not match the information in the database, SMS takes the device out of service. To view the devices that are not in synch with the database, click the Database Status tab.



To synchronize one or more devices with the database, follow these steps:

1. In the System Device Status dialog box, click the Database Status tab.

   If you are not already viewing the System Device Status dialog box, click Diagnostics>System Device Status on the Control menu to display it.

2. In the Setup Data Mismatch box, click the desired devices and drag them to the Selected Devices box (or use the >, >> buttons).

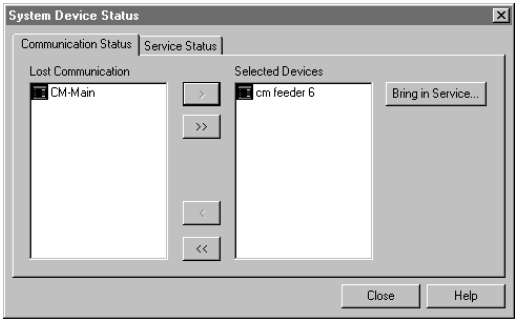
3. If you believe that the information stored in the devices is preferable to the information stored in the SMS database, click the Update Database button. Enter your username and password, then click OK. SMS copies the information from the devices to the database.

   OR

   If you believe that the information in the SMS database is preferable to the information stored in the devices, click the Update Device button. Enter your username and password, then click OK. SMS copies the information from the database to the devices.

Reestablishing Communication with Devices

When you perform a system communications test, or when you bring a system online, SMS attempts to communicate with each device in the system. SMS automatically takes devices that fail to communicate out of service. Click on the Communication Status tab to view a list of devices that have lost communications. You can attempt to reestablish communications with these devices.



To reestablish communication with devices that have lost communications, follow these steps:

1. In the System Device Status dialog box, click the Communication Status tab.

   If you are not already viewing the System Device Status dialog box, click Diagnostics>System Device Status on the Control menu to display it.

2. In the Lost Communication box, click the desired devices and drag them to the Selected Devices box (or use the >, >> buttons).

3. Click the Bring In Service button.

   SMS displays the System Communications Test dialog box.

4. Click the Start Testing button.

   SMS attempts to communicate to each of the selected devices and displays the status of each. If SMS communicates successfully with a device that was previously out of service due to a communications error, it compares the basic settings configuration of the device to the information stored in the SMS database. If the data matches, SMS places the device back in service. If the data does not match, the device remains out of service. You will need to synchronize the data in the device with the data in the database. See the previous section "Correcting Mismatches in Device Setup Data" for instructions.

5. Click Close to return to the System Device Status dialog box.

***Note**: Periodically, SMS performs a health check at which time it attempts to restore communications to non-communicating devices. You can change the interval at which SMS performs a health check using the SMSCfg program that is located in the SMS-3000 directory on the server PC. To change the health check interval, start SMSCfg, click on the Intervals tab, and enter the desired interval in the Health Check box.*

Placing Devices In and Out of Service

SMS allows you to place devices in and out of service. If, for instance, you needed to perform maintenance on a circuit, you'd likely remove control power from the circuit monitor. SMS would still try to communicate to the circuit monitor; causing communication errors. To temporarily suspend monitoring functions for the circuit monitor, you could place it out of service.

To place a device out of service, follow these steps:

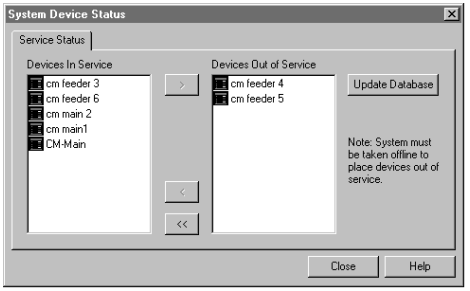
1. On the File menu, click Offline to take your system offline.

   Note: This takes the SMS network server offline and disconnects all active clients.

2. On the Control menu, click Diagnostics>System Device Status.

   SMS displays the System Device Status Dialog box.

3. Click on the Service Status tab.



4. In the Devices in Service box, click the devices to take out of service and drag them to the Devices Out of Service box (or use the > button).

5. Click the Update Database button to update the SMS database.

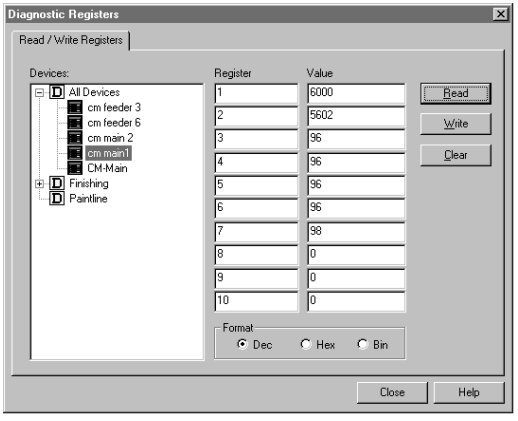
To place a device back in service, drag the device from the Devices Out of Service box back into the Devices In Service box, then click the Update Database button. Take the system offline, then place it back online. SMS places the device back in service.

Reading and Writing Registers

SMS allows you to read from and write directly to device registers. For example, you could use this feature to read a value that is not supported in SMS's standard tables. Refer to the instruction bulletin for a specific device for register numbers.

To read registers, follow these steps:

1. On the Control menu, click Diagnostics>Read/Write Registers (or press CTRL+R). SMS displays the Diagnostics Registers dialog box.



2. In the Devices box, click a device to read from.
3. In the Register boxes, enter up to 10 register numbers to read.
   To automatically enter sequential register numbers, enter the first register number in the top register box then press the down arrow key on your computer's keyboard.
4. Click the Read button.
   SMS displays the register values in the Value boxes. Click the radio buttons in the Format box to change the format of the displayed values.

To write registers, follow these steps:

1. On the Control menu, click Diagnostics>Read/Write Registers.
   SMS displays the Diagnostics Registers dialog box.
2. In the Devices box, click a device to write to.
3. In the Register boxes, enter up to 10 registers to write.
4. In the Format box, select the format to enter values.
5. In the Value boxes, enter the values to write.
6. Click the Write button.
   SMS displays the Security Check dialog box.
7. Enter your user and password, then click OK.
   SMS writes the values to the registers.

Displaying Circuit Monitor Onboard Data

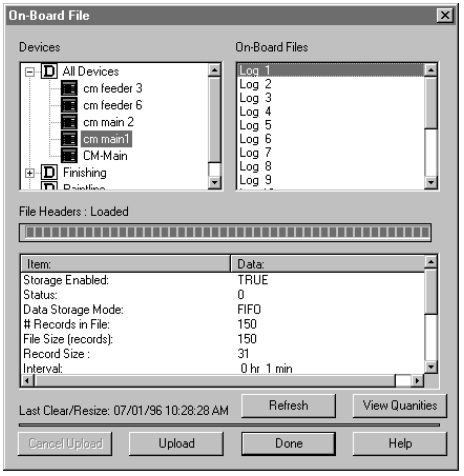
Typically, you will view historical data from Series 2000 Circuit Monitor onboard data log files in the form of a history table or time-trend plot. Chapter 10 tells how to view history tables and time-trend plots. Occasionally, you may want to retrieve onboard data directly from a Series 2000 Circuit Monitor and view it. You can do this using the Onboard Data File command on the Display menu.

The Onboard Data File command lets you retrieve, view, and print the following circuit monitor onboard files:

- 14 data log files
- Onboard event log file
- Min/max log file
- Maintenance log file

To retrieve onboard data from a circuit monitor, follow these steps:

1. On the Display menu, click Onboard Data File.
   SMS displays the Onboard File dialog box.



2. In the Devices box, click a series 2000 circuit monitor.

3. In the Onboard Files box, click the file that you want to view.
   The file information window at the bottom of the dialog box shows information about the selected onboard file including the number of records stored in the file, the logging interval, and more. To view a list of the quantities that are included in the log file, click View Quantities.

4. Click the Upload pushbutton.
   SMS retrieves the data from the circuit monitor and displays it in a window.

5. To print the data, click Print on the File menu.

6. To save the data to a file, click Save As on the File menu. SMS displays the Save Onboard Data Log dialog box. Choose a location, enter a filename, and select the desired Save As type. Click Save. SMS saves the data in the selected file format.

Seeing Who's Connected to the Server

At any time, you can see who is connected to the PowerLogic Network Server. To see who's connected, follow these steps:

1. On the Control menu, click Diagnostics>Connected Users.
   SMS displays a list of the users currently connected to the server.

Chapter 18—Using Dynamic Data Exchange (DDE)

SMS supports the Windows feature called Dynamic Data Exchange (DDE). DDE allows SMS to dynamically exchange data with other Windows applications that support DDE. SMS supports *server* DDE. Server DDE allows SMS to serve data to another application. For example, using server DDE, you could setup a Microsoft Excel spreadsheet to receive data from SMS.

A few of the many benefits you can obtain using DDE are:

- Trend a variety of power system info using Microsoft Excel, Lotus 123, etc.
- Analyze energy costs by department, individual processes, or other criteria
- Create custom reports
- Analyze cost of production based on various energy sources, number of machined operations, and so on
- Create custom interfaces including menus, macros, and dialog boxes
- Automate your reports to management

SMS Serving Data to Microsoft Excel (SMS as a DDE Server)

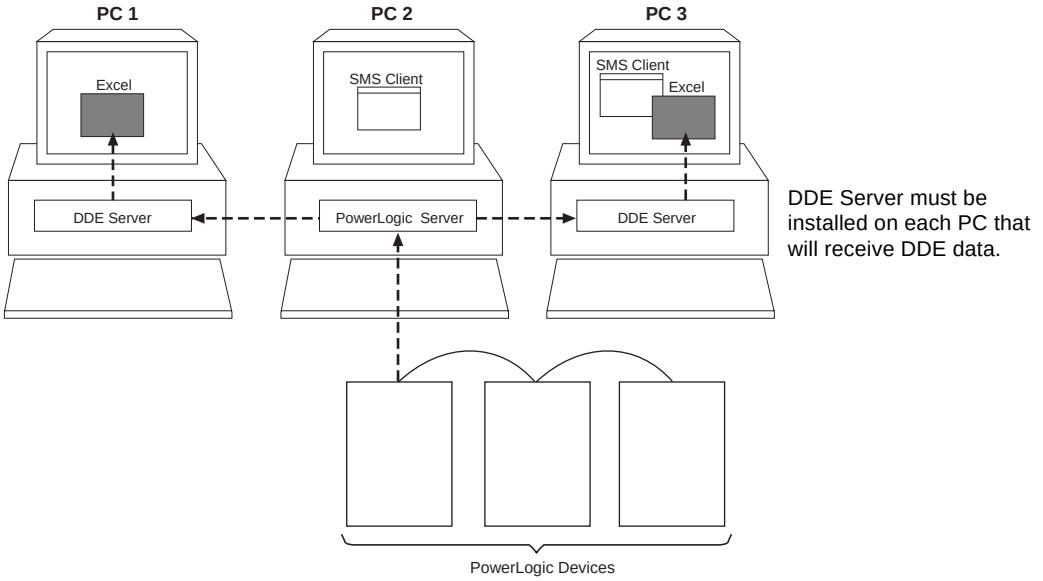
The figure **SMS Serving Data to Microsoft Excel** on the next page shows how SMS serves POWERLOGIC device data to Microsoft Excel. The POWERLOGIC Network Server reads data directly from registers in POWERLOGIC devices. The PowerLogic Network Server then serves the data to the SMS DDE Server, which serves the data to the Microsoft Excel spreadsheet.

The following are some important facts to know about using SMS as a DDE server.

- You must install a copy of the DDE server on each computer that you want to serve data to. In the illustration on the next page, data is being served to Microsoft Excel spreadsheets on two PCs, therefore the DDE server is installed on each PC.
- The maximum number of DDE servers that can serve data from one POWERLOGIC Network Server is equal to the number of licensed SMS clients. For example, if the PowerLogic network server is licensed for 5 SMS clients, the maximum number of DDE servers is 5.
- The SMS client software does not need to be installed on the DDE Server PCs (see PC 1 in the illustration). This is because the SMS client is not involved in the transfer of data. Data flows from the devices, to the PowerLogic Network Server, to the DDE Server, to Microsoft Excel.

  When would you *not* want to install the SMS client on a PC? In the illustration, PC 1 is located in the accounting department. DDE is used to bring energy usage data into

the Microsoft Excel spreadsheet where it is totalled and used to calculated energy costs. The accountant needs only the energy data and has no need for the SMS client software.

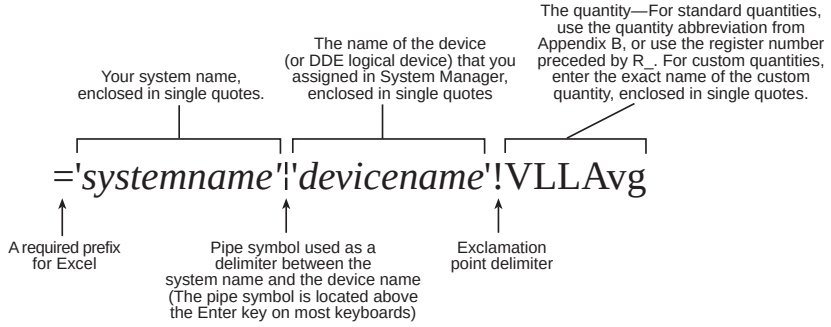


SMS Serving Data to Microsoft Excel (SMS as a DDE Server)

To use DDE to export data to Microsoft Excel, you will need to create a Microsoft Excel spreadsheet with DDE links. The following procedure tells how.

To use DDE to export data from SMS into a Microsoft Excel spreadsheet, do the following:

1. Take SMS offline, close the SMS client, and close the DDE server.
2. Open Microsoft Excel and create a spreadsheet.
3. Click in a cell, and enter the link text as described below.
   The link text describes the SMS system name, the device, and the quantity to import to the cell.



Note: *We recommend that you use the quantity abbreviations (from Appendix B) instead of register numbers in the link text. When you use the quantity abbreviations, SMS returns the data formatted; when you use register numbers, SMS returns the data unformatted. For example, if you used the quantity abbreviation "Temp" (for device temperature in degrees C) in the link text, SMS would return the data with a decimal point in the correct position—for example, 33.68. But if you used the register number 1002 in the link text, SMS would return the data without the decimal point—for example, 3368.*

4. Repeat step 3 for other cells until you have defined links for all desired quantities. Save your spreadsheet then close it.

5. Start the PowerLogic Network Server.

6. Start the SMS client software and put your system online.

7. Start the SMS DDE Server that is located on the same computer as your newly created Microsoft Excel spreadsheet.

8. Open your Microsoft Excel spreadsheet. After several seconds, you should see data in the cells.

   The rate at which data updates depends on the size of the spreadsheet and the DDE update interval. The next section tells how to change the DDE update interval.

Changing the DDE Update Interval

By default, SMS updates the Microsoft Excel spreadsheet every 15 seconds. You can change the DDE update interval using the SMSCfg program. (The SMSCfg program is located in the SMS-3000 directory on the server machine.) To change the update interval, follow these steps:

1. Start the SMSCfg program.

2. Click on the Intervals tab.

3. In the DDE Update Interval box, enter the desired interval in seconds.

4. Click OK to save your changes and exit the configuration program.

Appendix A—Viewing and Printing System Information

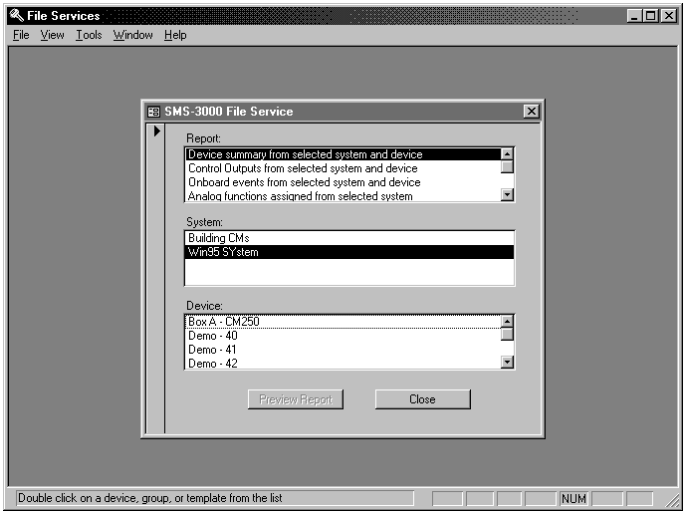
Included with SMS is a program called "File Services." The File Services program was installed in the SMS-3000 directory when you installed SMS. The File Services program lets you view and print system information such as device configuration, analog and digital function definitions, data log template definitions, and so on.

Note: *A printer must be installed on the PC on which File Services will run. If you need instructions on installing a printer, see your Windows documentation.*

To use the File Services program, do the following:

1. Click File Services on the Tools menu to start the File Services program.

   As the program starts, you'll see the Microsoft Access opening screen (File Services uses Microsoft Access to generate reports). The SMS-3000 File Service dialog box displays.



3. In the Report box, select the desired report.
4. If the report requires you to select other options such as a specific device or driver, additional boxes will appear. Make the appropriate selections.
5. To view the report, click Preview Report. Files Services displays the formatted report.
6. To print the report, click Print on the File menu.

Appendix B—Abbreviations for Quantities

You will use these abbreviations when creating DDE links in Microsoft® Excel spreadsheets. The abbreviations also appear in tables as column heads. The abbreviations are case sensitive when being used in Excel to set up DDE quantities.

Quantity	Abbreviation
Update Interval	Updateint
Frequency	Hz
Temperature	Temp
Current A	IA
Current B	IB
Current C	IC
Current N	IN
Current G	IG
Current Avg	IAvg
Current Apparent rms	IApp
Current Unbalance A	IUnbalA
Current Unbalance B	IUnbalB
Current Unbalance C	IUnbalC
Current Unbalance Worst	IUnbalW
Voltage A-B	VAB
Voltage B-C	VBC
Voltage C-A	VCA
Voltage L-L Avg	VLLAvg
Voltage A-N	VAN
Voltage B-N	VBN
Voltage C-N	VCN
Voltage L-N Avg	VLNAvg
Voltage Unbalance A-B	VUnbalAB
Voltage Unbalance B-C	VUnbalBC
Voltage Unbalance C-A	VUnbalCA
Voltage Unbalance L-L Worst	VUnbalLLW
Voltage Unbalance A-N	VUnbalAN
Voltage Unbalance B-N	VUnbalBN
Voltage Unbalance C-N	VUnbalCN
Voltage Unbalance L-N Worst	VUnbalLNW
Power Factor A	PFA
Power Factor B	PFB
Power Factor C	PFC
Power Factor Total	PFTtl
Displacement Power Factor A	DPFA
Displacement Power Factor B	DPFB

Quantity	Abbreviation
Displacement Power Factor C	DPFC
Displacement Power Factor Total	DPFTtl
Real Power A	kWA
Real Power B	kWB
Real Power C	kWC
Real Power Total	kWTtl
Reactive Power A	kVARA
Reactive Power B	kVARB
Reactive Power C	kVARC
Reactive Power Total	kVARTtl
Apparent Power A	kVAA
Apparent Power B	kVAB
Apparent Power C	kVAC
Apparent Power Total	kVATtl
THD Current A	THDIA
THD Current B	THDIB
THD Current C	THDIC
THD Current N	THDIN
THD Voltage A-N	THDVAN
THD Voltage B-N	THDVBN
THD Voltage C-N	THDVCN
THD Voltage A-B	THDVAB
THD Voltage B-C	THDVBC
THD Voltage C-A	THDVCA
thd Current A	thd_IA
thd Current B	thd_IB
thd Current C	thd_IC
thd Current N	thd_IN
thd Voltage A-N	thd_VAN
thd Voltage B-N	thd_VBN
thd Voltage C-N	thd_VCN
thd Voltage A-B	thd_VAB
thd Voltage B-C	thd_VBC
thd Voltage C-A	thd_VCA
K-Factor A	KFA
K-Factor B	KFB
K-Factor C	KFC
Crest Factor A	CFA
Crest Factor B	CFB
Crest Factor C	CFC
Crest Factor N	CFN
Fundamental Current Mag A	fIMagA
Fundamental Current Ang A	fIAngA
Fundamental Current Mag B	IMagB
Fundamental Current Ang B	fIAngB

Quantity	Abbreviation
Fundamental Current Mag C	fIMagC
Fundamental Current Ang C	fIAngC
Fundamental Current Mag N	fIMagN
Fundamental Current Ang N	fIAngN
Fundamental Current Mag G	fIMagG
Fundamental Current Ang G	fIAngG
Fundamental Voltage Mag A-N	fVMagAN
Fundamental Voltage Ang A-N	fVAngAN
Fundamental Voltage Mag B-N	fVMagBN
Fundamental Voltage Ang B-N	fVAngBN
Fundamental Voltage Mag C-N	fVMagCN
Fundamental Voltage Ang C-N	fVAngCN
Fundamental Voltage Mag A-B	fVMagAB
Fundamental Voltage Ang A-B	fVAngAB
Fundamental Voltage Mag B-C	fVMagBC
Fundamental Voltage Ang B-C	fVAngBC
Fundamental Voltage Mag C-A	fVMagCA
Fundamental Voltage Ang C-A	fVAngCA
Fundamental Real Power A	fkWA
Fundamental Real Power B	fkWB
Fundamental Real Power C	fkWC
Fundamental Real Power Total	fkWTtl
Fundamental Reactive Power A	fkVARA
Fundamental Reactive Power B	fkVARB
Fundamental Reactive Power C	fkVARC
Fundamental Reactive Power Total	fkVARTtl
Harmonic Factor A	HFA
Harmonic Factor B	HFB
Harmonic Factor C	HFC
Harmonic Factor Total	HFTtl
Harmonic Real Power A	hkWA
Harmonic Real Power B	hkWB
Harmonic Real Power C	hkWC
Harmonic Real Power Total	hkWTtl
Analog Input 1 Value	AnalogIn1
Analog Input 2 Value	AnalogIn2
Analog Input 3 Value	AnalogIn3
Analog Input 4 Value	AnalogIn4
Min Update Interval	MinUpdateInt
Min Frequency	MinHz
Min Temperature	MinTemp
Min Current A	MinIA
Min Current B	MinIB
Min Current C	MinIC
Min Current N	MinIN

Quantity	Abbreviation
Min Current G	MinIG
Min Current Avg	MinIAvg
Min Current Apparent rms	MinIApp
Min Current Unbalance A	MinUnbalA
Min Current Unbalance B	MinUnbalB
Min Current Unbalance C	MinUnbalC
Min Current Unbalance Worst	MinUnbalW
Min Voltage A-B	MinVAB
Min Voltage B-C	MinVBC
Min Voltage C-A	MinVCA
Min Voltage L-L Avg	MinVLLAvg
Min Voltage A-N	MinVAN
Min Voltage B-N	MinVBN
Min Voltage C-N	MinVCN
Min Voltage L-N Avg	MinLNAvg
Min Voltage Unbalance A-B	MinVUnbalAB
Min Voltage Unbalance B-C	MinVUnbalBC
Min Voltage Unbalance C-A	MinVUnbalCA
Min Voltage Unbalance L-L Worst	MinVUnbalLLW
Min Voltage Unbalance A-N	MinVUnbalAN
Min Voltage Unbalance B-N	MinVUnbalBN
Min Voltage Unbalance C-N	MinVUnbalCN
Min Voltage Unbalance L-N Worst	MinVUnbalLNW
Min Power Factor A	MinPFA
Min Power Factor B	MinPFB
Min Power Factor C	MinPFC
Min Power Factor Total	MinPFTtl
Min Displacement Power Factor A	MinDPFA
Min Displacement Power Factor B	MinDPFB
Min Displacement Power Factor C	MinDPFC
Min Displacement Power Factor Total	MinDPFTtl
Min Real Power A	MinkWA
Min Real Power B	MinkWB
Min Real Power C	MinkWC
Min Real Power Total	MinkWTtl
Min Reactive Power A	MinkVARA
Min Reactive Power B	MinkVARB
Min Reactive Power C	MinkVARC
Min Reactive Power Total	MinkVARTtl
Min Apparent Power A	MinkVAA
Min Apparent Power B	MinkVAB
Min Apparent Power C	MinkVAC
Min Apparent Power Total	MinkVATtl
Min THD Current A	MinTHDIA
Min THD Current B	MinTHDIB

Quantity	Abbreviation
Min THD Current C	MinTHDIC
Min THD Current N	MinTHDIN
Min THD Voltage A-N	MinTHDVAN
Min THD Voltage B-N	MinTHDVBN
Min THD Voltage C-N	MinTHDVCN
Min THD Voltage A-B	MinTHDVAB
Min THD Voltage B-C	MinTHDVBC
Min THD Voltage C-A	MinTHDVCA
Min thd Current A	Minthd_IA
Min thd Current B	Minthd_IB
Min thd Current C	Minthd_IC
Min thd Current N	Minthd_IN
Min thd Voltage A-N	Minthd_VAN
Min thd Voltage B-N	Minthd_VBN
Min thd Voltage C-N	Minthd_VCN
Min thd Voltage A-B	Minthd_VAB
Min thd Voltage B-C	Minthd_VBC
Min thd Voltage C-A	Minthd_VCA
Min K-Factor A	MinKFA
Min K-Factor B	MinKFB
Min K-Factor C	MinKFC
Min Crest Factor A	MinCFA
Min Crest Factor B	MinCFB
Min Crest Factor C	MinCFC
Min Crest Factor N	MinCFN
Min Fundamental Real Power A	MinfkWA
Min Fundamental Real Power B	MinfkWB
Min Fundamental Real Power C	MinfkWC
Min Fundamental Real Power Total	MinfkWTtl
Min Fundamental Reactive Power A	MinfkVARA
Min Fundamental Reactive Power B	MinfkVARB
Min Fundamental Reactive Power C	MinfkVARC
Min Fundamental Reactive Power Total	MinfkVARTtl
Min Harmonic Factor A	MinHFA
Min Harmonic Factor B	MinHFB
Min Harmonic Factor C	MinHFC
Min Harmonic Factor Total	MinHFTtl
Min Harmonic Real Power A	MinhkWA
Min Harmonic Real Power B	MinhkWB
Min Harmonic Real Power C	MinhkWC
Min Harmonic Real Power Total	MinhkWTtl
Min Analog Input Value 1	MinAnalogIn1
Min Analog Input Value 2	MinAnalogIn2
Min Analog Input Value 3	MinAnalogIn3
Min Analog Input Value 4	MinAnalogIn4

Quantity	Abbreviation
Max Update Interval	MaxUpdateInt
Max Frequency	MaxHz
Max Temperature	MaxTemp
Max Current A	MaxIA
Max Current B	MaxIB
Max Current C	MaxIC
Max Current N	MaxIN
Max Current G	MaxIG
Max Current Average	MaxIAvg
Max Current Apparent rms	MaxIApp
Max Current Unbalance A	MaxIUnbalA
Max Current Unbalance B	MaxIUnbalB
Max Current Unbalance C	MaxIUnbalC
Max Current Unbalance Worst	MaxIUnbalW
Max Voltage A-B	MaxVAB
Max Voltage B-C	MaxVBC
Max Voltage C-A	MaxVCA
Max Voltage L-L Avg	MaxVLLAvg
Max Voltage A-N	MaxVAN
Max Voltage B-N	MaxVBN
Max Voltage C-N	MaxVCN
Max Voltage L-N Avg	MaxVLNAvg
Max Voltage Unbalance A-B	MaxVUnbalAB
Max Voltage Unbalance B-C	MaxVUnbalBC
Max Voltage Unbalance C-A	MaxVUnbalCA
Max Voltage Unbalance L-L Worst	MaxVUnbalLL
Max Voltage Unbalance A-N	MaxVUnbalAN
Max Voltage Unbalance B-N	MaxVUnbalBN
Max Voltage Unbalance C-N	MaxVUnbalCN
Max Voltage Unbalance L-N Worst	MaxVUnbalLN
Max Power Factor A	MaxPFA
Max Power Factor B	MaxPFB
Max Power Factor C	MaxPFC
Max Power Factor Total	MaxPFTtl
Max Displacement Power Factor A	MaxDPFA
Max Displacement Power Factor B	MaxDPFB
Max Displacement Power Factor C	MaxDPFC
Max Displacement PF Total	MaxDPFTtl
Max Real Power A	MaxKWA
Max Real Power B	MaxKWB
Max Real Power C	MaxKWC
Max Real Power Total	MaxKWTtl
Max Reactive Power A	MaxkVARA
Max Reactive Power B	MaxkVARB
Max Reactive Power C	MaxkVARC

Quantity	Abbreviation
Max Reactive Power Total	MaxkVARTtl
Max Apparent Power A	MaxkVAA
Max Apparent Power B	MaxkVAB
Max Apparent Power C	MaxkVAC
Max Apparent Power Total	MaxkVATtl
Max THD Current A	MaxTHDIA
Max THD Current B	MaxTHDIB
Max THD Current C	MaxTHDIC
Max THD Current N	MaxTHDIN
Max THD Voltage A-N	MaxTHDVAN
Max THD Voltage B-N	MaxTHDVBN
Max THD Voltage C-N	MaxTHDVCN
Max THD Voltage A-B	MaxTHDVAB
Max THD Voltage B-C	MaxTHDVBC
Max THD Voltage C-A	MaxTHDVCA
Max thd Current A	Maxthd_IA
Max thd Current B	Maxthd_IB
Max thd Current C	Maxthd_IC
Max thd Current N	Maxthd_IN
Max thd Voltage A-N	Maxthd_VAN
Max thd Voltage B-N	Maxthd_VBN
Max thd Voltage C-N	Maxthd_VCN
Max thd Voltage A-B	Maxthd_VAB
Max thd Voltage B-C	Maxthd_VBC
Max thd Voltage C-A	Maxthd_VCA
Max K-Factor A	MaxKFA
Max K-Factor B	MaxKFB
Max K-Factor C	MaxKFC
Max Crest Factor A	MaxCFA
Max Crest Factor B	MaxCFB
Max Crest Factor C	MaxCFC
Max Crest Factor N	MaxCFN
Max Fundamental Real Power A	MaxfkWA
Max Fundamental Real Power B	MaxfkWB
Max Fundamental Real Power C	MaxfkWC
Max Fundamental Real Power Total	MaxfkWTtl
Max Fundamental Reactive Power A	MaxfkVARA
Max Fundamental Reactive Power B	MaxfkVARB
Max Fundamental Reactive Power C	MaxfkVARC
Max Fundamental Reactive Power Total	MaxfkVARTtl
Max Harmonic Factor A	MaxHFA
Max Harmonic Factor B	MaxHFB
Max Harmonic Factor C	MaxHFC
Max Harmonic Factor Total	MaxHFTtl
Max Harmonic Real Power A	MaxhkWA

Quantity	Abbreviation
Max Harmonic Real Power B	MaxhkWB
Max Harmonic Real Power C	MaxhkWC
Max Harmonic Real Power Total	MaxhkWTtl
Max Analog Input 1 Value	MaxAnalogIn1
Max Analog Input 2 Value	MaxAnalogIn2
Max Analog Input 3 Value	MaxAnalogIn3
Max Analog Input 4 Value	MaxAnalogIn4
Real Energy Into the Load	kWHr_I
Reactive Energy Into the Load	kVARHr_I
Real Energy Out of the Load	kWHr_O
Reactive Energy Out of the Load	kVARHr_O
Apparent Energy	kVAHr
Real Energy	kWHr
Reactive Energy	kVARHr
Conditional Real Energy In	CkWHr_I
Conditional Reactive Energy In	CkVARHr_I
Conditional Real Energy Out	CkWHr_O
Conditional Reactive Energy Out	CkVARHr_O
Conditional Apparent Energy	CkVAHr
Incremental Real Energy In	IkWHr_I
Incremental Reactive Energy In	IkVARHr_I
Incremental Real Energy Out	IkWHr_O
Incremental Reactive Energy Out	IkVARHr_O
Incremental Apparent Energy	IkVAHr
Demand Current Avg	IDAvg
Demand Current A	IAD
Demand Current B	IBD
Demand Current C	ICD
Demand Current N	IND
K-Factor Demand A	KFDA
K-Factor Demand B	KFDB
K-Factor Demand C	KFDC
Peak Demand Current Avg	PklDAvg
Peak Demand Current A	PklAD
Peak Demand Current B	PklBD
Peak Demand Current C	PklCD
Peak Demand Current N	PklND
Coincident K-Factor Demand Pk Prod. A	CoinKFDA
Coincident Current Demand Pk Prod. A	CoinIAD
Coincident K-Factor Demand Pk Prod. B	CoinKFDB
Coincident Current Demand Pk Prod. B	CoinIBD
Coincident K-Factor Demand Pk Prod. C	CoinKFDC
Coincident Current Demand Pk Prod. C	CoinICD
Power Factor Total Last Dmd Intl	PF_LDInt

Quantity	Abbreviation
Demand Real Power (KWD)	kWD
Demand Reactive Power (KVARD)	kVARD
Demand Apparent Power (KVAD)	kVAD
Peak Demand Real Power (KWD)	PkkWD
PF Coincident w/Peak KW Demand	PF_PkkWD
KVAR Dmd Coincident w/Peak KW Dmd	kVARD_PkkWD
KVA Dmd Coincident w/Peak KW Dmd	kVAD_PkkWD
Peak Demand Reactive Power (KVARD)	PkkVARD
PF Coincident w/Peak KVAR Demand	PF_PkkVARD
KW Dmd Coincident w/Peak KVAR Dmd	kWD_PkkVARD
KVA Dmd Coincident w/Peak KVAR Dmd	kVAD_PkkVARD
Peak Demand Apparent Power (KVAD)	PkkVAD
PF Coincident w/Peak KVA Demand	PF_PkkVAD
KW Dmd Coincident w/Peak KVA Dmd	kWD_PkkVAD
KAR Dmd Coincident w/Peak KVA Dmd	kVARD_PkkVAD
Predicted KW Demand	PredkWD
Predicted KVAR Demand	PredkVARD
Predicted KVA Demand	PredkVAD
Max KWD Last Incr. Energy Interval	MaxkWDLastInt
Max KVARD Last Incr. Energy Interval	MaxkVARDLastInt
Max KVAD Last Incr. Energy Interval	MaxkVADLastInt
Time Remaing in Dmd SubInterval	TimeRemSI
D/T Last Restart	DTLastRestart
D/T Peak Demand Current A	DTPkIAD
D/T Peak Demand Current B	DTPkIBD
D/T Peak Demand Current C	DTPkICD
D/T Peak Demand Real Power	DTPkkWD
D/T Last Reset Peak Dmd Currents	DTResetPkID
D/T Last Reset Min/Max	DTResetMinMax
D/T Last Circuit Tracker Write	DTCktTrkr
D/T Last Reset Peak Dmd Power	DTResetPkkWD
D/T Last Reset Accum. Energies	DTResetEnerg
D/T Last Control Power Failure	DTCPFail
D/T Energy Mgmt Level 1 Exceeded	DT_EMLevel1
D/T Energy Mgmt Level 2 Exceeded	DT_EMLevel2
D/T Energy Mgmt Level 3 Exceeded	DT_EMLevel3
Device Clock Date/Time	DT_3Regs
D/T K-Factor Dmd Peak Product A	DTCoinKFDA
D/T K-Factor Dmd Peak Product B	DTCoinKFDB
D/T K-Factor Dmd Peak Product C	DTCoinKFDC
D/T Peak Demand Reactive Power	DTPkkVARD
D/T Peak Demand Apparent Power	DTTPkkVAD
Incremental Energy Start Time of Day	IEStartTOD
D/T Clear of Conditional Energy	DTCEClr
D/T Last Increment Energy Update	DTIEUpdate

Quantity	Abbreviation
D/T Peak Demand Current Avg	DTPkIDAvg
D/T Peak Demand Current N	DTPkIND
D/T Max KWD in Last Inc. Energy Intvl.	DTIEMaxkWD
D/T Max KVARD in Last Inc. Energy Intvl.	DTIEMaxkVARD
D/T Max KVAD in Last Inc. Energy Intvl.	DTIEMaxkVAD
D/T Last Write to Registers 2000-2999	DTR2000_2999
Source of Last Write Reg. 2000-2999	SourceR2000_2999
D/T Last Write to Registers 5600-6999	DTR5600_6999
Source of Last Write Reg. 5600-6999	SourceR5600_6999
D/T Last Write to Registers 7000-7399	DTR7000_7399
Source of Last Write Reg. 7000-	SourceR7000_7399
Label	DeviceLabel
Nameplate	DeviceNP
Incremental Energy Interval	IncEnergyInt
Power Demand Interval	PowerDmdInt
Power Demand Sub-Interval	PowerDmdSubInt
Current/K-Factor Demand Interval	CurrentDmdInt
Input/Output Module Installed	IOModule
Energy Mgmt Setpoint Level 1	EMLvl1SP
Energy Mgmt Setpoint Level 2	EMLvl2SP
Energy Mgmt Setpoint Level 3	EMLvl3SP
Energy Mgmt Level 1 Highest Demand	EMLvl1Worst
Energy Mgmt Level 2 Highest Demand	EMLvl2Worst
Energy Mgmt Level 3 Highest Demand	EMLvl3Worst
KYZ Relay Mode	KYZMode
R1 Relay Mode	R1Mode
R2 Relay Mode	R2Mode
R3 Relay Mode	R3Mode
Analog Output 1 Label	AnalogOutLabel1
Analog Output 2 Label	AnalogOutLabel2
Analog Output 3 Label	AnalogOutLabel3
Analog Output 4 Label	AnalogOutLabel4
Analog Input 1 Units	AnalogIn1Units
Analog Input 2 Units	AnalogIn2Units
Analog Input 3 Units	AnalogIn3Units
Analog Input 4 Units	AnalogIn4Units
High Speed Event Pickup Mode	HiSpeedPickupMod
Oldest Record Event File	EvntOldRecord
Newest Record Event File	EvntNewRecord
Maximum Current Limit	MaxILimit
Maximum Voltage Limit	MaxVLimit
Maximum Power Limit	MaxPLimit
Energy Accumulation Mode	AccumMode
Energy Management Level 1 Status	EMLvl1Status
Energy Management Level 2 Status	EMLvl2Status

Quantity	Abbreviation
Energy Management Level 3 Status	EMLvl3Status
Input 1 Status	Input1
Input 2 Status	Input2
Input 3 Status	Input3
Input 4 Status	Input4
Input 5 Status	Input5
Input 6 Status	Input6
Input 7 Status	Input7
Input 8 Status	Input8
Input 9 Status	Input9
Input 10 Status	Input10
Input 11 Status	Input11
Input 12 Status	Input12
Input 13 Status	Input13
Input 14 Status	Input14
Input 15 Status	Input15
Input 16 Status	Input16
Input 17 Status	Input17
Input 18 Status	Input18
Input 19 Status	Input19
Input 20 Status	Input20
Input 21 Status	Input21
Input 22 Status	Input22
Input 23 Status	Input23
Input 24 Status	Input24
Input 25 Status	Input25
Input 26 Status	Input26
Input 27 Status	Input27
Input 28 Status	Input28
Input 29 Status	Input29
Input 30 Status	Input30
Input 31 Status	Input31
Input 32 Status	Input32
Input 33 Status	Input33
Input 34 Status	Input34
Input 35 Status	Input35
Input 36 Status	Input36
Input 37 Status	Input37
Input 38 Status	Input38
Input 39 Status	Input39
Input 40 Status	Input40
Input 41 Status	Input41
Input 42 Status	Input42
Input 43 Status	Input43
Input 44 Status	Input44

Quantity	Abbreviation
Input 45 Status	Input45
Input 46 Status	Input46
Input 47 Status	Input47
Input 48 Status	Input48
Input 49 Status	Input49
Input 50 Status	Input50
Input 51 Status	Input51
Input 52 Status	Input52
Input 53 Status	Input53
Input 54 Status	Input54
Input 55 Status	Input55
Input 56 Status	Input56
Input 57 Status	Input57
Input 58 Status	Input58
Input 59 Status	Input59
Input 60 Status	Input60
Input 61 Status	Input61
Input 62 Status	Input62
Input 63 Status	Input63
Input 64 Status	Input64
KYZ Relay Status	KYZStatus
R1 Relay Status	R1Status
R2 Relay Status	R2Status
R3 Relay Status	R3Status
R4 Relay Status	R4Status
KYZ Relay Control	KYZControl
R1 Relay Control	R1Control
R2 Relay Control	R2Control
R3 Relay Control	R3Control
KYZ Relay Override State	KYZOverride
R1 Relay Override State	R1Override
R2 Relay Override State	R2Override
R3 Relay Override State	R3Override
Voltage Swell Ph. A-B/A-N Alarm	Alarm201Status
Voltage Swell Ph. B-N Alarm	Alarm202Status
Voltage Swell Ph. C-N/C-B Alarm	Alarm203Status
Voltage Swell Ph. A Alarm	Alarm204Status
Voltage Swell Ph. B Alarm	Alarm205Status
Voltage Swell Ph. C Alarm	Alarm206Status
Current Swell Neutral Alarm	Alarm207Status
Voltage Sag Ph. A-B/A-N Alarm	Alarm208Status
Voltage Sag Ph. B-N Alarm	Alarm209Status
Voltage Sag Ph. C-N/C-B Alarm	Alarm210Status
Current Sag Ph. A Alarm	Alarm211Status
Current Sag Ph. B Alarm	Alarm212Status

Quantity	Abbreviation
Current Sag Ph. C Alarm	Alarm213Status
Current Sag Neutral Alarm	Alarm214Status
Over Current Ph. A Alarm	Alarm1Status
Over Current Ph. B Alarm	Alarm2Status
Over Current Ph. C Alarm	Alarm3Status
Over Current Neutral Alarm	Alarm4Status
Over Current Ground Alarm	Alarm5Status
Under Current Ph. A Alarm	Alarm6Status
Under Current Ph. B Alarm	Alarm7Status
Under Current Ph. C Alarm	Alarm8Status
Current Unbalance Ph. A Alarm	Alarm9Status
Current Unbalance Ph. B Alarm	Alarm10Status
Current Unbalance Ph. C Alarm	Alarm11Status
Current Phase Loss Alarm	Alarm12Status
Over Voltage Ph. A-N Alarm	Alarm13Status
Over Voltage Ph. B-N Alarm	Alarm14Status
Over Voltage Ph. C-N Alarm	Alarm15Status
Over Voltage Ph. A-B Alarm	Alarm16Status
Over Voltage Ph. B-C Alarm	Alarm17Status
Over Voltage Ph. C-A Alarm	Alarm18Status
Under Voltage Ph. A-N Alarm	Alarm19Status
Under Voltage Ph. B-N Alarm	Alarm20Status
Under Voltage Ph. C-N Alarm	Alarm21Status
Under Voltage Ph. A-B Alarm	Alarm22Status
Under Voltage Ph. B-C Alarm	Alarm23Status
Under Voltage Ph. C-A Alarm	Alarm24Status
Voltage Unbalance Ph. A-N Alarm	Alarm25Status
Voltage Unbalance Ph. B-N Alarm	Alarm26Status
Voltage Unbalance Ph. C-N Alarm	Alarm27Status
Voltage Unbalance Ph. A-B Alarm	Alarm28Status
Voltage Unbalance Ph. B-C Alarm	Alarm29Status
Voltage Unbalance Ph. C-A Alarm	Alarm30Status
Voltage Phase Loss Alarm	Alarm31Status
Over KVA Alarm	Alarm32Status
Over KW Into the Load Alarm	Alarm33Status
Over KW Out of the Load Alarm	Alarm34Status
Over KVAR Into the Load Alarm	Alarm35Status
Over KVAR Out of the Load Alarm	Alarm36Status
Over Demand Current Ph. A Alarm	Alarm37Status
Over Demand Current Ph. B Alarm	Alarm38Status
Over Demand Current Ph. C Alarm	Alarm39Status
Over Demand Current Average	Alarm40Status
Over Frequency Alarm	Alarm41Status
Under Frequency Alarm	Alarm42Status
Lagging Power Factor Alarm	Alarm43Status

Quantity	Abbreviation
Leading Power Factor Alarm	Alarm44Status
Lagging Displacement P.F. Alarm	Alarm45Status
Leading Displacement P.F. Alarm	Alarm46Status
Over THD Current Ph. A Alarm	Alarm49Status
Over THD Current Ph. B Alarm	Alarm50Status
Over THD Current Ph. C Alarm	Alarm51Status
Over THD Voltage Ph. A-N Alarm	Alarm52Status
Over THD Voltage Ph. B-N Alarm	Alarm53Status
Over THD Voltage Ph. C-N Alarm	Alarm54Status
Over THD Voltage Ph. A-B Alarm	Alarm55Status
Over THD Voltage Ph. B-C Alarm	Alarm56Status
Over THD Voltage Ph. C-A Alarm	Alarm57Status
Over K-Factor Ph. A Alarm	Alarm58Status
Over K-Factor Ph. B Alarm	Alarm59Status
Over K-Factor Ph. C Alarm	Alarm60Status
Over Predicted KVA Demand Alarm	Alarm61Status
Over Predicted KW Demand Alarm	Alarm62Status
Over Predicted KVAR Demand Alarm	Alarm63Status
Over KVA Demand Level 1 Alarm	Alarm64Status
Over KVA Demand Level 2 Alarm	Alarm65Status
Over KVA Demand Level 3 Alarm	Alarm66Status
Over KW Demand Level 1 Alarm	Alarm67Status
Over KW Demand Level 2 Alarm	Alarm68Status
Over KW Demand Level 3 Alarm	Alarm69Status
Over KVAR Demand Alarm	Alarm70Status
Over Lagging Power Factor Alarm	Alarm71Status
Under KW Alarm	Alarm72Status
Reverse Power Alarm	Alarm73Status
Phase Reversal Alarm	Alarm74Status
Input 1 Off to On Alarm	Alarm75Status
Input 2 Off to On Alarm	Alarm76Status
Input 3 Off to On Alarm	Alarm77Status
Input 4 Off to On Alarm	Alarm78Status
Input 5 Off to On Alarm	Alarm79Status
Input 6 Off to On Alarm	Alarm80Status
Input 7 Off to On Alarm	Alarm81Status
Input 8 Off to On Alarm	Alarm82Status
Input 1 On to Off Alarm	Alarm83Status
Input 2 On to Off Alarm	Alarm84Status
Input 3 On to Off Alarm	Alarm85Status
Input 4 On to Off Alarm	Alarm86Status
Input 5 On to Off Alarm	Alarm87Status
Input 6 On to Off Alarm	Alarm88Status
Input 7 On to Off Alarm	Alarm89Status
Input 8 On to Off Alarm	Alarm90Status

Quantity	Abbreviation
End of Incr. Energy Interval Event	Alarm99Status
Power-Up/Reset Event	Alarm100Statu
End of Demand Interval Event	Alarm101Statu
End of Update Cycle Event	Alarm102Statu
Over Analog Input 1 Alarm	Alarm103Statu
Over Analog Input 2 Alarm	Alarm104Statu
Over Analog Input 3 Alarm	Alarm105Statu
Over Analog Input 4 Alarm	Alarm106Statu
Under Analog Input 1 Alarm	Alarm107Statu
Under Analog Input 2 Alarm	Alarm108Statu
Under Analog Input 3 Alarm	Alarm109Statu
Under Analog Input 4 Alarm	Alarm110Statu
Breaker 9 Status/Control	BKR9
Breaker 10 Status/Control	BKR10
Breaker 11 Status/Control	BKR11
Breaker 12 Status/Control	BKR12
Breaker 13 Status/Control	BKR13
Breaker 14 Status/Control	BKR14
Breaker 15 Status/Control	BKR15
Breaker 16 Status/Control	BKR16
Breaker 1 Status/Control	BKR1
Breaker 2 Status/Control	BKR2
Breaker 3 Status/Control	BKR3
Breaker 4 Status/Control	BKR4
Breaker 5 Status/Control	BKR5
Breaker 6 Status/Control	BKR6
Breaker 7 Status/Control	BKR7
Breaker 8 Status/Control	BKR8
Breaker 25 Status/Control	BKR25
Breaker 26 Status/Control	BKR26
Breaker 27 Status/Control	BKR27
Breaker 28 Status/Control	BKR28
Breaker 29 Status/Control	BKR29
Breaker 30 Status/Control	BKR30
Breaker 31 Status/Control	BKR31
Breaker 32 Status/Control	BKR32
Breaker 17 Status/Control	BKR17
Breaker 18 Status/Control	BKR18
Breaker 19 Status/Control	BKR19
Breaker 20 Status/Control	BKR20
Breaker 21 Status/Control	BKR21
Breaker 22 Status/Control	BKR22
Breaker 23 Status/Control	BKR23
Breaker 24 Status/Control	BKR24
Breaker 41 Status/Control	BKR41

Quantity	Abbreviation
Breaker 42 Status/Control	BKR42
Breaker 33 Status/Control	BKR33
Breaker 34 Status/Control	BKR34
Breaker 35 Status/Control	BKR35
Breaker 36 Status/Control	BKR36
Breaker 37 Status/Control	BKR37
Breaker 38 Status/Control	BKR38
Breaker 39 Status/Control	BKR39
Breaker 40 Status/Control	BKR40
Demand Current % Capacity	DmdCap
Peak Demand Current % Capacity	PkDmdCap
Breaker Status	810DBrkrStatus
Breaker Trip Unit Status	810DBrkrTripStat
Breaker Load Relative to 85% LDPU	810DHiLoad
Breaker LDPU in Progress	810D_LDPU
Breaker Reverse Power Status	810DNegPwr
Relay Trip Status	DRTripStat
Relay Pickup Status	DR_PU
D/T Last Phase Inst. O/C Pickup	DTPhInstPU
D/T Last Phase Time O/C Pickup	DTPhTimePU
D/T Last Ground Fault Inst. O/C Pickup	DTGFInstPU
D/T Last Ground Fault Time O/C Pickup	DTGFTimePU
Cause of Last Trip	CauseTrip
D/T of Last Trip	DTLastTrip
Phase A Current at Last Trip	IA_Trip
Phase B Current at Last Trip	IB_Trip
Phase C Current at Last Trip	IC_Trip
Neutral Current at Last Trip	IN_Trip
Ground Current at Last Trip	IG_Trip
Average Current at Last Trip	IAvg_Trip
Real Power (KW) at Last Trip	kW_Trip
Real Energy (KWH) at Last Trip	kWHr_Trip
Demand Current Avg. at Last Trip	IDAvg_Trip
Demand Current A at Last Trip	IAD_Trip
Demand Current B at Last Trip	IBD_Trip
Demand Current C at Last Trip	ICD_Trip
Demand Real Power at Last Trip	kWD_Trip
Cause of 2nd Last Trip	CauseTrip2
D/T of 2nd Last Trip	DTLastTrip2
Phase A Current at 2nd Last Trip	IA_Trip2
Phase B Current at 2nd Last Trip	IB_Trip2
Phase C Current at 2nd Last Trip	IC_Trip2
Ground Current at 2nd Last Trip	IG_Trip2
Average Current at 2nd Last Trip	IAvg_Trip2
Demand Current Avg. at 2nd Last Trip	IDAvg_Trip2

Quantity	Abbreviation
Demand Current A at 2nd Last Trip	IAD_Trip2
Demand Current B at 2nd Last Trip	IBD_Trip2
Demand Current C at 2nd Last Trip	ICD_Trip2
Cause of 3rd Last Trip	CauseTrip3
D/T of 3rd Last Trip	DTLastTrip3
Phase A Current at 3rd Last Trip	IA_Trip3
Phase B Current at 3rd Last Trip	IB_Trip3
Phase C Current at 3rd Last Trip	IC_Trip3
Ground Current at 3rd Last Trip	IG_Trip3
Average Current at 3rd Last Trip	IAvg_Trip3
Demand Current Avg. at 3rd Last Trip	IDAvg_Trip3
Demand Current A at 3rd Last Trip	IAD_Trip3
Demand Current B at 3rd Last Trip	IBD_Trip3
Demand Current C at 3rd Last Trip	ICD_Trip3
Breaker Sensor/Rating Plug Size	PlugSize
Breaker Rating Plug Multiplier	PlugMult
Long Delay Pickup Slope	LDPUSlope
Long Delay Pickup Amp Setting	LDPUAmps
Long Delay Pickup Time Delay	LDPUDelay
Short Delay Pickup Slope	SDPUSlope
Short Delay Pickup Amp Setting	SDPUAmps
Short Delay Pickup Time Delay	SDPUDelay
Instantaneous Pickup Amp Setting	InstPUAmps
Ground Fault Pickup Slope	GFPUSlope
Ground Fault Pickup Amp Setting	GFPUAmps
Ground Fault Pickup Time Delay	GFPUDelay
Fourth Pole Protection Option	810DFourthPole
Frequency Select Option	810DFreqSel
Long Delay Memory Option	810DLDMem
Long Delay Option	810DLD
Ground Fault Option	810DGF
Short Delay Option	810DSD
Discriminator Option	810DDisc
Instantaneous Protection Option	810DInst
Phase CT Ratio:5	PhCTRatio
Ground CT Ratio:5	GFCTRatio
Phase Pickup Time Delay	PhPUTD
Phase Inst. Pickup Time Delay	PhInstPUTD
Ground Pickup Time Delay	GFPUTD
Phase Pickup Amp Setting	PhPUAmps
Ground Inst. Pickup Time Delay	GFInstPUTD
Phase Inst. Pickup Amp Setting	PhInstPUAmps
Ground Inst. Pickup Amp Setting	GFInstPUAmps
Phase Relay Time Current Curv	PhTCC
Ground Relay Time Current Curve	GFTCC

Quantity	Abbreviation
Total Breaker Trips Since Counter Reset	N810DTrips
Number Long Delay Trips Since Reset	NLDTrips
Number Short Delay Trips Since Reset	NSDTrips
Number Inst. Trips Since Reset	NInstTrips
Number G.F. Trips Since Reset	N810DGFTrips
Number Discriminator Trips Since Reset	N810DDiscTrips
Number Override Trips Since Reset	N810DOvrideTrips
D/T Last Reset of 810D Trip Counters	DTRstTripCtr810D
D/T Last Breaker Operation	DTLastBrkrOp
Total Relay Trips Since Counter Reset	NDRTrips
Phase Time O/C Trips Since Reset	NPhTrips
Phase Inst. O/C Trips Since Reset	NPhInstTrips
G.F. Time O/C Trips Since Reset	NDRGFTrips
G.F. Inst. O.C. Trips Since Reset	NGFInstTrips
D/T Last Reset of DR Trip Counters	DTRstTripCtrD
PIF3 Battery Status	PIF3BattStat
MicroLogic Breaker Trip Status	PIF3TripStatus
Breaker Plug Rating	PIF3PlugRating
Breaker Type	PIF3BrkrType
External Ground Fault System Option	PIF3ExtGF
Short Time Option	PIF3SD
Ground Fault Option	PIF3GF
Instantaneous Pickup Option	PIF3Inst
Number Overload Trips	NOverloadTrips
Number Short Circuit Trips	NSCTrips
Number Ground Fault Trips	NGFTrips
Hottest Coil Temperature	HotCoilTemp
Coil 1 (A) Temperature	Coil1Temp
Coil 2 (B) Temperature	Coil2Temp
Coil 3 (C) Temperature	Coil3Temp
Transformer Fans Status	FanStatus
Transformer Fans Mode	FanMode
Transformer Type	TransformerType
Fans On Setpoint	FansOnTemp
Fans Off Setpoint	FansOffTemp
Temperature Alarm Pickup Setpoint	AlarmOnTemp
Temperature Alarm Dropout Setpoint	AlarmOffTemp
Hi-Temp Shutdown Setpoint	ShutdownTemp
Fans-On Setpoint Status	FansTempStatus
Alarm Setpoint Status	AlarmTempStatus
Shutdown Setpoint Status	ShutdownStatus

Appendix C—Entering Pickup and Dropout Setpoints and Time Delays for CM2000 On-Board Alarms

This appendix lists permissible values for pickup and dropout setpoints and time delays for CM-2150 and higher on-board alarms and events with Version 14 firmware and later. Exact values must be determined by the user based on the application. The **Series 2000 Circuit Monitor** instruction bulletin lists detailed definitions for alarms and events.

The following tables list more specific guidelines for entering pickup and dropout setpoints and time delays from this software.

General Rules

The following are general rules for entering the setpoints and time delays:

- Do not enter commas for any value. For example, enter 10000, not 10,000.
- Time delays can be set from zero to 32767 seconds, in whole second increments, except as noted for the Swell and Sag events, which are in cycles.

Differences Between Software and Front Panel Displays

Important: *The pickup and dropout setpoints downloaded to the circuit monitor from the software may differ from the setpoints viewed from the front panel LED display on the circuit monitor itself. This is because the software displays scaled values while the circuit monitor displays register values.*

Two examples of this:

- With PT ratio set at 138000:120 and an undervoltage alarm set at 130000 volts, a pickup value of 130000 is entered and downloaded from the software to the circuit monitor. From the circuit monitor front panel, the pickup value displays as 13000, because the maximum raw register value allowed in the circuit monitor is 32767; the circuit monitor then applies a "scale factor" of 10 to the 13000 register value for actual pickup at 130000 volts.
- For any alarm codes that are set in tenths of percent (such as Alarm 9—Current Unbalance Phase A), you can enter, for example, 16.2 percent pickup from the software and download that value to the circuit monitor. However, the circuit monitor front panel will display a value of 162.

Any perceived conflict such as those between the software settings and the circuit monitor front panel displayed settings can be resolved by referring to the **Series 2000 Circuit Monitor** instruction bulletin.

Alarm No.	Description	Pickup/Dropout Units	Remarks/Comments/Examples
1 2 3 4 5	Over Current Phase A Over Current Phase B Over Current Phase C Over Current Neutral Over Current Ground	Amps	Enter positive integer values. Pickup value higher than dropout. Example: 500 amp pickup, 425 amp dropout.
6 7 8	Under Current Phase A Under Current Phase B Under Current Phase C	Amps	Enter positive integer values. Pickup value lower than dropout. Example: 425 amp pickup, 500 amp dropout.
9 10 11	Current Unbalance Phase A Current Unbalance Phase B Current Unbalance Phase C	Tenths %	Enter positive decimal values (to tenths if needed). Pickup value higher than dropout. Example: 20% pickup, 7.5% dropout. Alarm pickup is based on the percentage difference between the phase current with respect to the average of all three phase currents.
12	Current Phase Loss (Any 1)	Tenths %	Enter positive decimal values (to tenths if needed). Pickup value lower than dropout. Example: 80% pickup, 92.5% dropout. Alarm pickup is based on ratio of smallest phase current to largest phase current.
13 14 15 16 17 18	Over Voltage Phase A-N Over Voltage Phase B-N Over Voltage Phase C-N Over Voltage Phase A-B Over Voltage Phase B-C Over Voltage Phase C-A	Volts	Enter positive integer values. Pickup value higher than dropout. Example: 495 volt pickup, 485 volt dropout.
19 20 21 22 23 24	Under Voltage Phase A-N Under Voltage Phase B-N Under Voltage Phase C-N Under Voltage Phase A-B Under Voltage Phase B-C Under Voltage Phase C-A	Volts	Enter positive integer values. Pickup value lower than dropout. Example: 460 volt pickup, 475 volt dropout.
25 26 27 28 29 30	Voltage Unbalance Phase A-N Voltage Unbalance Phase B-N Voltage Unbalance Phase C-N Voltage Unbalance Phase A-B Voltage Unbalance Phase B-C Voltage Unbalance Phase C-A	Tenths %	Enter positive decimal value (to tenths if needed). Pickup value higher than dropout. Example: 10% pickup, 2.5% dropout. Alarm pickup is based on the percentage difference between the phase voltage with respect to the average of all three phase voltages.
31	Voltage Phase Loss (Any 1)	Volts	Enter positive integer values. Pickup value lower than dropout. Example: 100 volt pickup, 475 volt dropout. Alarm will not pick up on simultaneous undervoltage or loss on all three phases.

Alarm No.	Description	Pickup/Dropout Units	Remarks/Comments/Examples
32	Over KVA	KVA	Enter positive integer values. Pickup value higher than dropout. Example: 2000 KVA pickup, 1750 KVA dropout.
33	Over KW Into the Load	KW	Enter positive integer values. Pickup value higher than dropout. Example: 2000 KW pickup, 1750 KW dropout. Think of this alarm as "over-positive" KW whereas Alarm 34 below is "over-negative" KW.
34	Over KW Out of the Load	KW	Enter positive integer values. Pickup value higher than dropout. Example: 2000 KW pickup, 1750 KW dropout. Think of this alarm as "over-negative" KW; note that setpoints are, however, entered as positive values.
35	Over KVAR Into the Load	KVAR	Enter positive integer values. Pickup value higher than dropout. Example: 2000 KVAR pickup, 1750 KVAR dropout. Think of this alarm as "over-positive" or "over-leading" KVAR whereas Alarm 36 below is "over-negative" or "over-lagging" KVAR.
36	Over KVAR Out of the Load	KVAR	Enter positive integer values. Pickup value higher than dropout. Example: 2000 KVAR pickup, 1750 KVAR dropout. Think of this alarm as "over-negative" or "over-lagging" KVAR; note that setpoints are, however, entered as positive values.
37 38 39 40	Over Current Demand Phase A Over Current Demand Phase B Over Current Demand Phase C Over Demand Current Average	Amps	Enter positive decimal values. Pickup value higher than dropout. Example: 500 amp pickup, 425 amp dropout.
41	Over Frequency	Hertz in hundredths	Enter positive integer values (to hundredths if needed). Pickup value higher than dropout. Example: 60.25 Hz pickup, 60 Hz dropout.
42	Under Frequency	Hertz in hundredths	Enter positive integer values (to hundredths if needed). Pickup value lower than dropout. Example: 59.75 Hz pickup, 60 Hz dropout.
43	Lagging Power Factor Total	Power Factor in thousandths	Enter decimal values (to thousandths if needed). Pickup value must be negative (lagging) and more lagging than dropout. Dropout value can be positive (leading) or negative (lagging) and must be less lagging than pickup. Example: -.85 pickup, -.925 dropout. Example: -.9 pickup, .975 dropout.
44	Leading Power Factor Total	Power Factor in thousandths	Enter decimal values (to thousandths if needed). Pickup value must be positive (leading) and more leading than dropout. Dropout value can be positive (leading) or negative (lagging) and must be less leading than pickup. Example: .95 pickup, -.95 dropout. Example: .9 pickup, .975 dropout.

Alarm No.	Description	Pickup/Dropout Units	Remarks/Comments/Examples
45 46	Lagging Displacement Power Factor Total Leading Displacement Power Factor Total	Power Factor in thousandths	Alarms 45 and 46 function the same as alarms 43 and 44, respectively, except that alarms 45 and 46 are based on displacement power factor whereas alarms 43 and 44 are based on true RMS power factor.
47 48	Reserved		
49 50 51 52 53 54 55 56 57 58 59 60	Over THD Current Phase A Over THD Current Phase B Over THD Current Phase C Over THD Voltage Phase A-N Over THD Voltage Phase B-N Over THD Voltage Phase C-N Over THD Voltage Phase A-B Over THD Voltage Phase B-C Over THD Voltage Phase C-A Over K-Factor Phase A Over K-Factor Phase B Over K-Factor Phase C	Tenths %	Enter Positive decimal values (to tenths if needed). Pickup value higher than dropout. Example: 5% pickup, 2.5% dropout.
61	Over Predicted KVA Demand	KVA	Enter positive integer values. Pickup value higher than dropout. Example: 2000 KVA pickup, 1750 KVA dropout.
62	Over Predicted KW Demand	KW	Enter positive integer values. Pickup value higher than dropout. Example: 2000 KW pickup, 1750 KW dropout. Alarm operation is based on the absolute value of KW demand so ti will pick up on positive or negative KW demand at the pickup setpoint.
63	Over Predicted KVAR Demand	KVAR	Enter positive integer values. Pickup value higher than dropout. Example: 2000 KVAR pickup, 1750 KVAR dropout. Alarm operation is based on the absolute value of KVAR demand so it will pick up on positive (leading) or negative (lagging) KVAR demand at the pickup setpoint.
64 65 66	Over KVA Demand Level 1 Over KVA Demand Level 2 Over KVA Demand Level 3	KVA	Enter positive integer values. Pickup value higher than dropout. Example: 2000 KVA pickup, 1750 KVA dropout.
67 68 69	Over KW Demand Level 1 Over KW Demand Level 2 Over KW Demand Level 3	KW	Enter positive integer values. Pickup value higher than dropout. Example: 2000 KW pickup, 1750 KW dropout. Alarm operation is based on the absolute value of KW demand so it will pick up on positive or negative KW demand at the pickup setpoint.

Alarm No.	Description	Pickup/Dropout Units	Remarks/Comments/Examples
70	Over KVAR Demand	KVAR	Enter positive integer values. Pickup higher than dropout. Example: 2000 KVAR pickup, 1750 KVAR dropout. Alarm operation is based on the absolute value of KVAR demand so it will pick up on positive (leading) or negative (lagging) KVAR demand at the pickup setpoint.
71	Over Lagging Power Factor Total	Power Factor in thousandths	Note that this alarm is based on average power factor over the demand interval therefore it is relatively slow to respond compared to alarms 43 through 46 which are based on instantaneous power factor values. Enter decimal value (to thousandths if needed). Pickup value can be positive (leading) or negative (lagging) and must be less leading than dropout. Dropout value can be positive (leading) or negative (lagging) and must be more leading than pickup. Example: .98 pickup, .95 dropout. Example: -.9 pickup, .975 dropout. Example: -.9 pickup, -.95 dropout.
72	Under KW Total	KW	Enter positive integer values. Pickup value lower than dropout. Example: 1750 KW pickup, 2000 KW dropout. Alarm operation is based on the absolute value of KW so it will pick up on positive or negative KW at the pickup setpoint.
73	Reverse Power	KW	Enter positive integer values. Pickup value higher than dropout. Example: 200KW pickup, 50KW dropout. Alarm operation will occur only on reverse or negative power conditions. For the example pickup and drop- out setpoints, alarm pickup will occur at -200KW, dropout will occur at -50KW.
74	Phase Reversal	Not Applicable	Setpoints and time delays do not apply to this alarm. Alarm operation occurs when phase voltage waveform phase rotation is not A-B-C. Note: If C-B-A phase rotation is normal instead of A-B-C, the Circuit Monitor can be reprogrammed to make C-B-A "normal"; refer to the Series 2000 Circuit Monitor instruction bulletin for direction on how to do this.
75 76 77 78 79 80 81 82	Input 1 Transition Off to On Input 2 Transition Off to On Input 3 Transition Off to On Input 4 Transition Off to On Input 5 Transition Off to On Input 6 Transition Off to On Input 7 Transition Off to On Input 8 Transition Off to On	Not Applicable	Setpoints and time delays do not apply to these alarms. Alarms pick up when the I/O module digital input status changes from off to on. Alarms drop out when the input status changes back to the off state.

Alarm No.	Description	Pickup/Dropout Units	Remarks/Comments/Examples
83 84 85 86 87 88 89 90	Input 1 Transition On to Off Input 2 Transition On to Off Input 3 Transition On to Off Input 4 Transition On to Off Input 5 Transition On to Off Input 6 Transition On to Off Input 7 Transition On to Off Input 8 Transition On to Off	Not Applicable	Setpoints and time delays do not apply to these alarms. Alarms pick up when the I/O module digital input status changes from on to off. Alarms drop out when the input status changes back to the on state.
91 92 93 94 95 96 97 98	Reserved		
99	End of Incremental Energy Interval	Not Applicable	Setpoints and time delays do not apply to this alarm. Refer to the Series 2000 Circuit Monitor instruction bulletin for application of this alarm.
100	Power-Up/Reset	Not Applicable	Setpoints and time delays do not apply to this alarm. This alarm marks any time the Circuit Monitor powers up or resets.
101	End of Demand Interval	Not Applicable	Setpoints and time delays do not apply to this alarm. Refer to the Series 2000 Circuit Monitor instruction bulletin for application of this alarm.
102	End of Update Cycle	Not Applicable	Setpoints and time delays do not apply to this alarm. Refer to the Series 2000 Circuit Monitor instruction bulletin for application of this alarm.
103 104 105 106	Over Analog Input Channel 1 Over Analog Input Channel 2 Over Analog Input Channel 3 Over Analog Input Channel 4	Analog value to thousandths	Enter decimal values to match precision chosen in the I/O Module setup screen (units, tenths, hundredths, or thousandths). Pickup value can be positive to negative, and must be more positive or less negative than dropout. Dropout value can be positive or negative. Setpoints will depend on how you set up the upper and lower limit values and precision for the analog input. Example: With upper limit 1000 PSI and lower limit 200 PSI and precision in units: if you want to alarm at 950 PSI and dropout at 900 PSI, enter 950 for pickup, 900 for dropout. Example: With upper limit 5.000V and lower limit 1.000V and precision in thousandths: if you want to alarm at 4.925V and drop out at 4V, enter 4.925 for pickup, 4 (or 4.0, 4.00, or 4.000) for dropout. Example: With upper limit 5.00V and lower limit -5.00V and precision in hundredths: if you want to alarm at 2.5V and drop out at -1V, enter 2.5 (or 2.50) for pickup, -1 (or -1.0, or -1.00) for dropout.

Alarm No.	Description	Pickup/Dropout Units	Remarks/Comments/Examples
107 108 109 110	Under Analog Input Channel 1 Under Analog Input Channel 2 Under Analog Input Channel 3 Under Analog Input Channel 4	Analog value to thousandths	Enter decimal values to match precision chosen in the I/O Module setup screen (units, tenths, hundredths, or thousandths). Pickup value can be positive or negative, and must be less positive or more negative than dropout. Dropout value can be positive or negative. Setpoints will depend on how you set up the upper and lower limit values and precision for the analog input. Example: With upper limit 1000 PSI and lower limit 200 PSI and precision in units: if you want to alarm at 500 PSI and dropout at 600 PSI, enter 500 for pickup, 600 for dropout. Example: With upper limit 5.000V and lower limit 1.000V and precision in thousandths: if you want to alarm at 4.125V and drop out at 4.5V, enter 4.125 for pickup, 4.5 (or 4.50, or 4.500) for dropout. Example: With upper limit 5.00V and lower limit -5.00V and precision in hundredths: if you want to alarm at -1V and drop out at 2.5V, enter -1 (or -1.0, or -1.00) for pickup, 2.5 (or 2.50) for dropout.
111 112 113 114 115 116 117 118 119 120	Reserved		

Alarm No.	Description	Pickup/Dropout Units	Remarks/Comments/Examples
201 202 203	Voltage Phase A-N/A-B Swell Voltage Phase B-N Swell Voltage Phase C-N/C-B Swell	Volts or Tenths %	If you want to have the alarm pick up based on the magnitude of the voltage: Do not check the "Relative" check box. Enter positive integer values. Pickup value higher than dropout. Example: 495 volt pickup, 480 volt dropout. If you want to have the alarm pick up based on the percent difference between the present RMS voltage and the average voltage calculated over the last 5 metering cycle intervals: Check the "Relative" check box. Enter positive decimal values for percent (to tenths if needed). Pickup value higher than dropout. Example: 7.5% pickup, 5% dropout. Enter time delays in cycles. Note: CM2350 or higher is required to use these alarms. Alarm operation is based on continuous RMS calculations.
204 205 206 207	Current Phase A Swell Current Phase B Swell Current Phase C Swell Current Neutral Swell	Amps or Tenths %	If you want to have the alarm pick up based on the magnitude of the current: Do not check the "Relative" check box. Enter positive integer values. Pickup value higher than dropout. Example: 500 amp pickup, 425 amp dropout. If you want to have the alarm pick up based on the percent difference between the present RMS current and the average current calculated over the last 5 metering cycle intervals: Check the "Relative" check box. Enter positive decimal values for percent (to tenths if needed). Pickup value higher than dropout. Example: 7.5% pickup, 5% dropout. Enter time delays in cycles. Note: CM2350 or higher is required to use these alarms. Alarm operation is based on continuous RMS calculations.

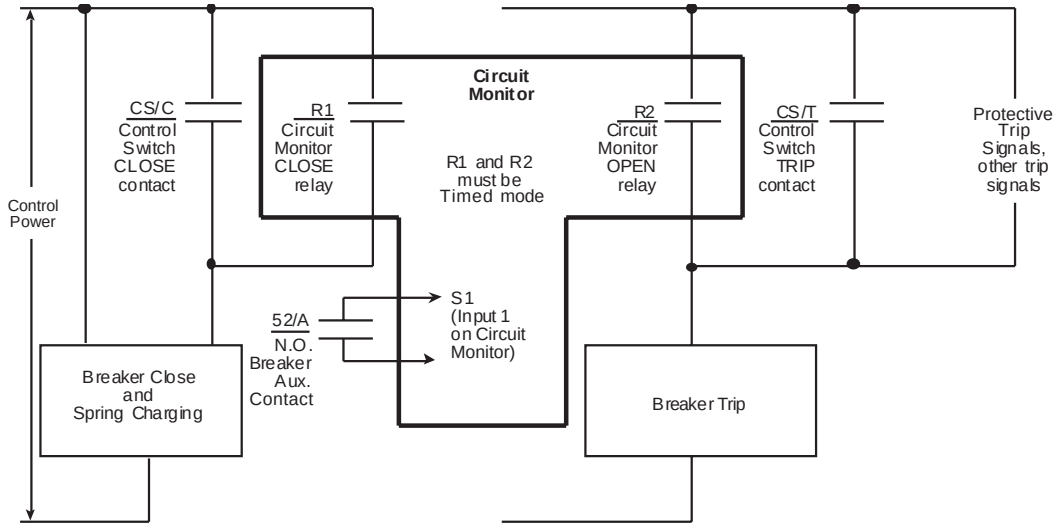
Alarm No.	Description	Pickup/Dropout Units	Remarks/Comments/Examples
208 209 210	Voltage Phase A-N/A-B Sag Voltage Phase B-N Sag Voltage Phase C-N/C-B Sag	Volts or Tenths %	If you want to have the alarm pick up based on the magnitude of the voltage: Do not check the "Relative" check box. Enter positive integer values. Pickup value lower than dropout. Example: 465 volt pickup, 480 volt dropout. If you want to have the alarm pick up based on the percent difference between the present RMS voltage and the average voltage calculated over the last 5 metering cycle intervals: Check the "Relative" check box. Enter positive decimal values for percent (to tenths if needed). Pickup value higher than dropout. Example: 7.5% pickup, 5% dropout. Enter time delays in cycles. Note: CM2350 or higher is required to use these alarms. Alarm operation is based on continuous RMS calculations.
211 212 213 214	Current Phase A Sag Current Phase B Sag Current Phase C Sag Current Neutral Sag	Amps or Tenths %	If you want to have the alarm pick up based on the magnitude of the current: Do not check the "Relative" check box. Enter positive integer values. Pickup value lower than dropout. Example: 425 amp pickup, 500 amp dropout. If you want to have the alarm pick up based on the percent difference between the present RMS current and the average current calculated over the last 5 metering cycle intervals: Check the "Relative" check box. Enter positive decimal values for percent (to tenths if needed). Pickup value higher than dropout. Example: 7.5% pickup, 5% dropout. Enter time delays in cycles. Note: CM2350 or higher is required to use these alarms. Alarm operation is based on continuous RMS calculations.
215 216	Reserved		

Appendix D—Control Output Examples

This appendix contains examples for both *manual* and *override* control outputs. The examples are presented simply to help illustrate the differences between manual and override control outputs.

Manual Control Output Example

The following example is for motor-operated circuit breaker control using circuit monitor relays. The figure below is an example of a simplified control schematic of a motor operated circuit breaker, called Feeder 1.



Circuit monitors can be used for this type of control. Using the procedures in "Chapter 13—Control Outputs", two manual control outputs (one to close the breaker, one to open the breaker) can be set up for separate circuit monitor relays.

Note: *This example control schematic cannot take into account considerations such as circuit monitor relay contact voltage and current ratings versus the installed system, integration into complex control schemes, etc.*

Setup

To set up the example manual control output you should first define a digital function called *Feeder 1 Status* as described below, then assign the function to the circuit monitor that is being used to perform control. The function can then be used for association.

Digital Function Name: Feeder 1 Status

Quantity: Input 1 Status

Equal condition name: Closed

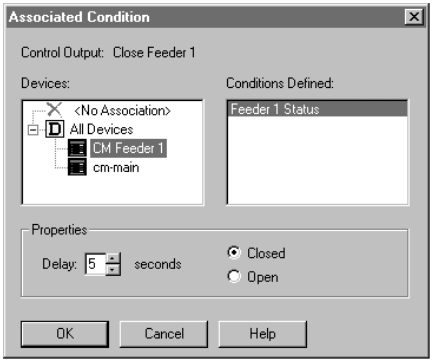
Non-Equal condition name: Open

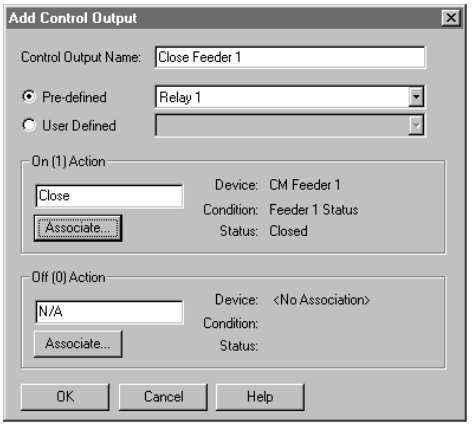
Delay: 0

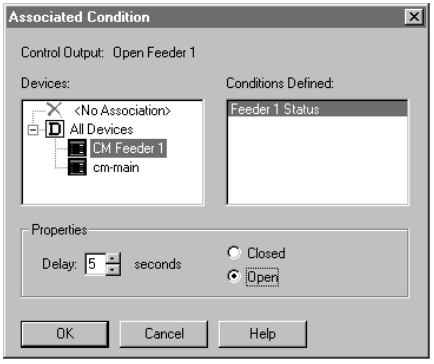
Alarm: None

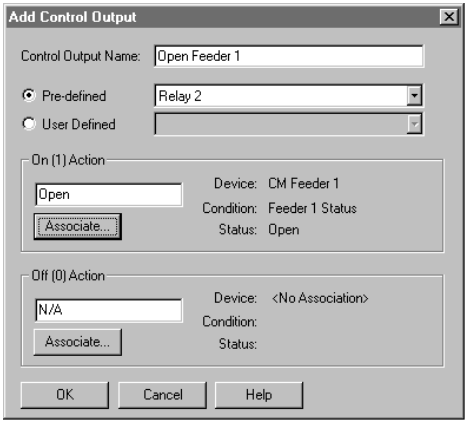
After defining the digital function and assigning it to the circuit monitor, you must define two manual control outputs as described in the following table. The dialog boxes on the next page illustrate the defined control outputs and associations.

	Control Output Name	ON Action Name	OFF Action Name	Association
Relay R1	Close Feeder 1	Close	N/A	To associate with the On state of the 52/A auxiliary contact: In the Add Control Output dialog box, click the Associate button in the On(1) Action box. In the Associated Condition dialog box: • Select the *Feeder 1 Status* digital function • Enter a 5 second delay and select the *Closed* option button.
Relay R2	Open Feeder 1	Open	N/A	To associate with the Off state of the 52/A auxiliary contact: In the Add Control Output dialog box, click the Associate button in the Off(0) Action box. In the Associated Condition dialog box: • Select the *Feeder 1 Status* digital function • Enter a 5 second delay and select the *Open* option button.









Setup (continued)

The circuit monitor relays must behave like a momentary push button or a spring return breaker control switch, so the relays need to be set for "timed" mode.

Series 2000 Circuit Monitor relays:

- Both relays ***not*** enabled for on-board control
- Both relay modes "Timed" with hold time set to 1 second (breaker close and open operations are usually much faster than this)

CM-144/CM-244 relays:

- Both relays must be set up for "fail-safe" mode, with a fail-safe duration of 1 second (breaker close and open operations are usually much faster than this). This requires taking the circuit monitor key switch to SETUP, establishing communications with the unit, and writing values to registers 400 and 401. See the circuit monitor instruction bulletin for more details.

Override Control Output Example

The following example describes how you could transfer load to a generator for the "Over KW Demand Level 1" alarm condition.

Situation—You have a CM-2350 metering your incoming utility service. You have named this circuit monitor "Utility Main." You are using "Over KW Demand Level 1" (Alarm Number 67 in Appendix C) to automatically energize relay R1 when KW Demand on the utility exceeds 2000 KW for 5 minutes. The normally open R1 contact is wired to an automatic transfer switch. Upon R1 contact closure, the transfer switch controls start a generator and the transfer switch switches to the emergency position. Load is thereby automatically transferred from utility power to your generator when KW Demand exceeds the 2000 KW pickup setpoint for 5 minutes.

When utility KW Demand subsequently decreases below a dropout setpoint of 1500 KW for 10 minutes, the R1 relay de-energizes and opens its contact. The transfer switch controls then cause the transfer switch to switch back to the normal position, and the transfer switch controls handle generator cooldown and shutdown. Load is thereby automatically transferred back to the utility when KW Demand drops below the 1500 KW dropout setpoint for 10 minutes.

You define an Override Control Output named "Gen Load Xfer" for two reasons:

- Maintenance or unplanned down time on the generator or transfer switch—During the maintenance or down time period you do not want relay R1 to close even if the Over KW Demand Level 1 alarm were to occur.
- Testing provisions for the system—You want the ability to test system operation by overriding the state of relay R1.

To accomplish this, the setup steps are summarized in this section, followed by a hypothetical chain of events.

Setup

Circuit Monitor Input/Output Module Setup:

Set up relay R1 on your "Utility Main" Circuit Monitor for "Normal" mode, and check the "Enable Onboard Operation" check box.

Circuit Monitor On-board Alarms/Events Setup:

On your "Utility Main" Circuit Monitor, enable alarm number 67 "Over KW Demand Level 1" and set it up as follows:

Pickup: 2000 KW

Pickup time delay: 300 seconds

Dropout: 1500 KW

Dropout time delay: 600 seconds

Setup (continued)

Priority: 2

Operate relay R1 upon occurrence of the event

Note: *Forced data log entries, forced 4-cycle and 12-cycle waveform captures, and priority levels are discussed in more detail in* ***Chapter 5—Advanced On-Board Setup for Series 2000 Circuit Monitors****.*

Using the Functions/Alarms... command on the Setup menu, define three global digital functions for the device type Series 2000 Circuit Monitor as described below. After defining the functions, assign all three to the circuit monitor "Utility Main."

Digital function name: R1 Status

Quantity: R1 Relay Status

Equal condition name: On

Non-Equal condition name: Off

Delay: 0

Alarm: Visual and acknowledge not necessary; use factory default Level 9.

Digital function name: R1 Ovride Status

Quantity: R1 Relay Override State

Equal condition name: Overridden

Equal condition alarm: Choose an alarm level that is set up for visual and acknowledge required

Non-Equal condition name: Not Overridden

Non-Equal condition alarm: Level 9 factory default

Poll Interval: 0

Note*: This next function is based on the assumption that you have a transfer switch auxiliary contact, closed when the switch is in emergency position, open when the switch is in normal position, to physically wire to input 1.*

Digital function name: "Xfer Sw Position"

Quantity: Input 1 Status

Equal condition name: Emergency

Non-Equal condition name: Normal

Delay: 0

Alarm: Not necessary, but most users would likely alarm on the Emergency condition

After defining and assigning the digital functions, you must use the Control Outputs command on the Setup menu to set up an Override Control Output named “Gen Load Xfer” for the circuit monitor “Utility Main” as described below. The dialog boxes below illustrate the defined control output and associations.

Predefined: Relay 1

On (1) Action name: Gen Xfer On

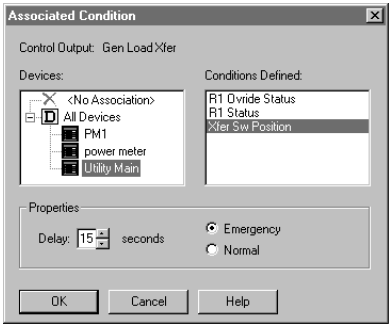
Off (0) Action name: Gen Xfer Off

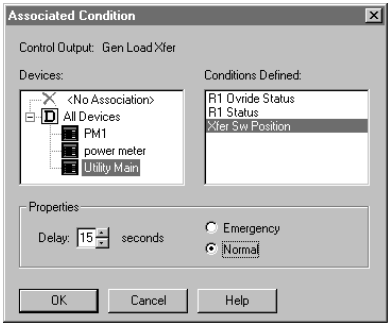
Association for On (1) Action (Gen Xfer On):

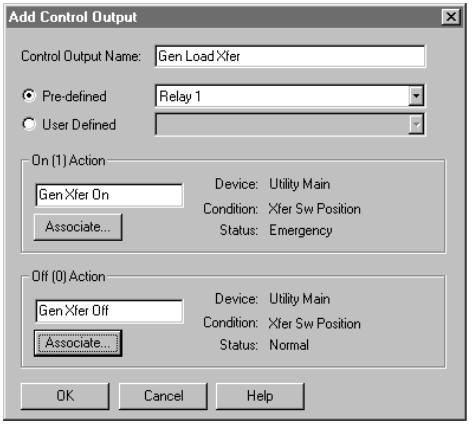
- Device: Utility Main
- Digital Function: Xfer Sw Position
- Delay: 15 seconds (to allow time for generator start and transfer to generator power)
- Select option button for “Emergency” condition

Association for Off (0) Action (Gen Xfer Off):

- Device: Utility Main
- Digital Function: Xfer Sw Position
- Delay: 15 seconds (to allow time for transfer back to utility power)
- Select option button for “Normal” condition







Hypothetical Chain of Events

Situation: You are online with your system. KW Demand is presently below 2000 KW. Therefore, relay R1 is off, the transfer switch is in the "Normal" position, and the generator is shut down in automatic standby. You intend to conduct a system test by forcing relay R1 to energize.

To conduct the system test as described in the scenario above, follow these steps:

1. On the Control menu, click Control Outputs.
2. In the Devices box, select Utility Main.
3. In the Control Names box, select Gen Load Xfer.
4. Click the Override button.
   SMS prompts you for your username and password.
5. Enter your username and password then click OK.
   SMS displays a message asking for confirmation.
6. Click OK.
   Relay R1 is overridden in its present (OFF) state. You will have to acknowledge the "R1 Ovride Status - Overridden" alarm. This alarm stays active until the relay is released from "Override."
7. Click the Gen Xfer On button to force relay R1 on.
8. Enter your username and password, then click OK.
   SMS asks you to confirm your action.
9. Click OK.
   Relay R1 energizes and closes its contact. The transfer switch controls should start the generator and the transfer switch should switch to the "Emergency" position. You will have to acknowledge the success or failure of this control action (the criteria being that the transfer switch actually switched to the "Emergency" position as you set up in the Control Output "Associate" function).

Load has been automatically transferred from utility power to the generator. You let the generator run for some period of time.

After the generator run period, you want to return load to the utility source and shut down the generator. You can do this in one of two ways:

- Since KW Demand is presently below the 2000 KW pickup setpoint, you can release the Override on relay R1 and be assured that R1 will not pick up again automatically when on-board control is restored.

- You can first force relay R1 off by executing the Gen Xfer Off Control Output, and then release the Override at some later time. You might want to use this method to ensure that the generator did not start regardless of KW Demand level on the Utility Main Circuit Monitor.

You choose to use the first method from the preceding list, because KW Demand is presently below the 2000 KW pickup setpoint and you are satisfied that the system is fully ready to operate automatically.

To end the system test described in the preceding paragraph, follow these steps:

1. On the Control menu, click Control Outputs.
2. In the Devices box, choose Utility Main.
3. In the Control Names box, choose Gen Load Xfer.
4. Click the Release Override button, enter your username and password, and click OK.

   SMS displays a warning message. Click OK to continue.

   Relay R1 will now de-energize and open its contact because the circuit monitor's on-board controls detect that the KW Demand is below the pickup setpoint. The transfer switch controls then cause the transfer switch to switch back to the "Normal" position, and the transfer switch controls handle generator cooldown and shutdown. Your system is back in automatic mode of operation.
5. Click Close to exit the Control Outputs dialog box.

Appendix E—SMS Client Command Line Parameters

The SMS-3000 client program supports three optional command line parameters:

- /LOGON — causes the SMS client to bypass the usual login dialog by providing the username and password at the command line
- /WORKSPACE — causes the SMS client to automatically open a workspace file on program startup
- /DELAY — causes the SMS client to wait for a specified number of seconds before attempting to connect to the POWERLOGIC Network Server

Two notes about using command line parameters:

- The parameters are case sensitive. Always enter /LOGON, /WORKSPACE, and /DELAY using capital letters.
- Follow each parameter with a space, then a data string. If the data string contains spaces, enclose the data string in double quotes. If the data string does not contain spaces, quotes are not required. For example:

/WORKSPACE c:myworkspace.wks	(No space in data string—quotes not required)
/WORKSPACE "c:my workspace.wks"	(Space in data string after *my*—quotes required)

Using the /LOGON Parameter

The /LOGON parameter causes the SMS client to bypass the usual login dialog by providing the username and password at the command line as follows:

/LOGON *username,password*

Separate the username and password by a comma with no spaces. If the username or password is invalid, SMS displays the login dialog box.

Example:

c:\SMS-3000\bin\sms3000.exe /LOGON JohnDoe,powerguy

Note: *When you use this parameter, you are disabling the login security feature. Any person could start the SMS client without a password or username. Also, a person could look at the command line and find out the username and password.*

Using the /WORKSPACE Parameter

The /WORKSPACE parameter causes the SMS client to automatically open a workspace on program startup. Enter the parameter as follows:

/WORKSPACE *workspace_file*

where *workspace_file* is the complete path statement to the workspace file.

Examples:

c:\SMS-3000\bin\sms3000.exe /WORKSPACE c:\basicviews.wks
c:\SMS-3000\bin\sms3000.exe /LOGON JohnDoe,powerguy /WORKSPACE "c:\basic views.wks"

***Note**: If the workspace file was saved with an online system, the same system must be online before the workspace can be opened. If the system is not online, SMS issues a warning message and the workspace is not opened.*

Using the /DELAY Parameter

The /DELAY parameter causes the SMS client to wait for a specified number of seconds before attempting to connect to the POWERLOGIC Network Server. You will use this parameter only if you have set up the POWERLOGIC Network Server and the SMS client to start up automatically after a computer power loss. The delay gives the POWERLOGIC Network Server time to start up and place a system online. Enter the parameter as follows:

/DELAY *time_delay*

where *time_delay* is the number of seconds of delay before the client starts.

Example:

c:\SMS-3000\bin\sms3000.exe /LOGON JohnDoe,powerguy /DELAY 30

Appendix F—Error Codes

This appendix contains the most common error codes that occur in SMS-3000. Beside each code is a brief description of what happened to cause the error. The code number only displays in the Event Log.

Code	Description
015	Communications overflow
017	Remote device inactive
029	Attempt to send a message with illegal route
101	File already open
107	Record out of range
230	Pipe state is invalid
231	All pipe instances are busy
232	Pipe is being closed
233	No process is on the other end of pipe
234	More data is available
256	Time-out - COM port
258	SY/LINK invalid parameter
259	SY/LINK device not initialized
260	SY/LINK device time-out
261	SY/LINK invalid route
262	SY/LINK invalid register list
263	SY/LINK reset time-out
1100	No system exists in database
1101	A device was not found in database
1102	Unable to load a DLL
1103	The DLL does not support this function
1104	Operation failed for unknown reason
1105	Operation failed because system is offline
1106	Invalid user
1107	Invalid password
1108	Create failed
1109	Out of service
1110	Out of database sync
1111	Insufficient authority
1112	Time-out
1113	Lookup failed
1114	No driver
1115	Device not connected
1116	User has terminated/canceled online
1117	Invalid system specified

Code	Description
1118	Sample request to CommServer failed
1119	No hardware key attached to computer
1120	System already locked
1121	Sample storage problem
1122	Network error
1123	Max connections
4008	SquareD ID # is not valid for this device type
4201	Semaphore is not the active device
4202	Could not get the semaphore
4300	Invalid record number
4301	Invalid file number
4302	File status error
4303	File is not enabled or file size is zero
4304	File is in Fill and Hold and it is full
4305	Not all the records requested were uploaded
4306	Unable to verify the waveform was triggered
43683	RS-232 bad channel
43684	RS-232 device not responding
43685	RS-232 unable to comply

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